COLONY OF MAURITIUS

## DEPARTMENT OF AGRICULTURE

# Eighteenth Annual Report

of the

# Sugarcane Research Station

1947

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# SUGARCANE RESEARCH STATION, MAURITIUS
## 18th ANNUAL REPORT 1947

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# Eighteenth Annual Report of the Sugarcane Research Station for the Year 1947

## General

From the meteorological standpoint, the year under review was generally characterised by shortage of rain during both the growing and maturing season and a temperature somewhat below the normal average throughout the year.

Rainfall was particularly deficient in March, when the deficiency amounted to 60 per cent. of the average and drought conditions prevailed in the drier localities of the island. Unsettled weather conditions were prevalent during the first quarter owing to the occurrence of distant cyclones, one of which was of appreciable intensity. Weather conditions improved during April and June when good precipitations occurred but rainfall was again below average in May and July, particularly during the latter month: rainfall was above average in August and practically normal in September. The cool weather experienced throughout most of the ripening season was most favourable to the maturing process. Temperature was below average, while the rainfall was sufficient to maintain the cane in good physiological condition. As a result of these factors extraction of sugar was beyond all expectations, the average figure for the whole colony being of the order of 12·5 per cent. as against the previous maximum of 12·1 per cent. in 1943. Yields of cane in the fields were also above estimates, with the result that the 1947 crop will amount to approximately 350,000 tons—the highest on record. Although there is probably a great deal still to be learnt concerning the effect of weather conditions on the growth and maturation processes in the cane, it is highly probable that the following factors were of importance in the attainment of such an outstanding production.

1. Exceptionally favourable growth conditions occurred in November, 1946, so that the young plantations were away to an excellent start: extensive root growth during this period probably helped to tide the cane over the dry conditions during the first quarter of 1947.

2. The June rains, which helped the cane in the North of the Island to make up for previous subnormal growth.

3. The relatively high proportion of plant cane, first and second ratoons as a result of replanting foodcrop lands in cane.

4. The high proportion of the Mauritius seedling M.134/32 and other Sugarcane Research Station seedlings which in this crop accounted for 81 per cent. of all the cane harvested.

It is obvious that the growth capacity and drought resisting powers of the variety M.134/32 in particular has modified to a considerable degree previous conceptions on the influence of climatic conditions on crop growth.

5. Finally, maturation conditions were exceptionally favourable and excellent sucrose content was maintained throughout the crushing season.

Rainfall figures for three stations in the dry, intermediate and high rainfall districts and temperature data for Réduit, supplied by the Statistician, Department of Agriculture are set out in the following table—

| | *Pamplemousses Experiment Station Rainfall (Inches)* | | *Central Experiment Station, Réduit Rainfall (Inches)* | | *Temperature above + or below − normal (0°C)* | *Royal College Curepipe Rainfall (Inches)* | |
|---|---|---|---|---|---|---|---|
| | *Normal* | *Period under consideration* | *Normal* | *Period under consideration* | | *Normal* | *Period under consideration* |
| November 1946 ... | 2·13 | 7·75 | 2·33 | 8·60 | +0·4 | 5·71 | 12·56 |
| December ,, ... | 4·91 | 1·60 | 6·37 | 5·75 | +0·3 | 9·71 | 8·26 |
| January 1947 ... | 9·56 | 5·17 | 10·32 | 7·58 | +0·7 | 16·33 | 11·37 |
| February ,, ... | 8·74 | 5·93 | 10·95 | 7·83 | −0·2 | 17·28 | 17·00 |
| March ,, ... | 9·32 | 1·64 | 11·94 | 2·55 | −0·8 | 19·31 | 7.95 |
| April ,, ... | 5·96 | 4·27 | 5·41 | 4·35 | −0·4 | 12·39 | 12·84 |
| May ,, ... | 4·48 | 0·87 | 4·24 | 1·34 | +0·2 | 9·86 | 6·07 |
| June ,, ... | 3·43 | 3·84 | 3·11 | 4·16 | −0·3 | 7·47 | 10·72 |
| July ,, ... | 2·93 | 1·81 | 2·75 | 2·72 | +0·5 | 8·57 | 5·53 |
| August ,, ... | 2·59 | 1·95 | 2·47 | 3·15 | −0·5 | 7·79 | 11·81 |
| September ,, ... | 1·83 | 1·16 | 1·71 | 1·62 | −0·3 | 5·78 | 5·69 |
| October ,, ... | 1·95 | 0·83 | 1·91 | 0·83 | −0·2 | 4·52 | 4·07 |
| November ,, ... | 2·13 | 1·22 | 2·33 | 1·64 | −0·9 | 5·71 | 5·72 |
| TOTAL ... | 59·96 | 38·04 | 65·84 | 52·12 | −1·5 | 130·43 | 118·59 |

A census of cane varieties was carried out during the year by the Statistician Department of Agriculture at the request of the Acting Director. The results of this census shows that the Sugarcane Research Station cane varieties are now dominant in the island.

Some of the high lights of these data are given below—

POSITION AS AT THE END OF 1946

Area under cultivation in arpents (1·04 acres)

| | *M 171/30* | *M 134/32* | *M 112/34* | *M 165/38* | *M 63/39* | *M 76/39* | *Total SRS varieties* |
|---|---|---|---|---|---|---|---|
| *Estates with factories* ... | 6,259 | 44,620 | 1,746 | 43 | 56 | 54 | 67,108 |
| % of total ... ... ... | 9·3 | 66·4 | 2·6 | — | — | — | 78 |
| *Estates without factories* ... | 2,073 | 12,466 | 192 | 29 | 30 | 31 | 16,288 |
| % of total ... ... ... | 12·7 | 76·5 | 1·1 | — | — | | 90 |
| *Grand Total all estates* ... | 8,332 | 57,087 | 1,938 | 72 | 86 | 84 | 83,396 |
| % of total ... ... ... | 9·9 | 68·4 | 2·3 | — | — | — | 80·6 |
| *Projected areas for plantation in 1947* : | | | | | | | |
| All estates ... ... ... | 950 | 10,135 | 370 | 196 | 297 | 236 | 12,184 |
| *Estimated position as at the end of 1947* : | | | | | | | |
| *Total area* ... ... ... | 9,282 | 67,222 | 2,308 | 268 | 383 | 320 | 95,580 |
| % of total ... ... ... | 11·03 | 80·54 | 2·74 | 0·32 | 0·45 | 0·38 | 95·46 |

PERCENTAGE GROWN IN VARIOUS DISTRICTS AS AT END OF 1946

| | *M 171/30* | *M 134/32* | *M 112/34* |
|---|---|---|---|
| Pamplemousses ... ... | 3·6 | 75·8 | 2·6 |
| Rivière du Rempart ... | 1·0 | 70·9 | 2·9 |
| Flacq ... ... ... | 18·0 | 58·7 | 2·6 |
| Moka ... ... ... | 19·9 | 73·6 | — |
| Plaines Wilhems ... ... | 7·6 | 71·0 | 1·1 |
| Black River ... ... ... | 8·4 | 53·8 | 9·8 |
| Grand Port ... ... ... | 10·3 | 70·3 | 0·7 |
| Savanne ... ... ... | 7·8 | 65·2 | 3·4 |

It will be seen that by far the largest areas of M.171/30 are grown in the wet, higher parts of Flacq and Moka, and M.112/34 in the irrigated area of Black River. M.134/32 is obviously a success under most climatic conditions but is particularly favoured in the drier localities. It is of interest also to record the consensus of opinion of planters who made comments on the field and factory characteristics of these varieties.

*M.171/30.* Growth stated to be somewhat slow during the boom stage but makes up for this by steady growth during the cool winter months.

It is resistant to borer and to red rot, but is affected to some extent with Smut in the drier districts. Germination is erratic and it is somewhat susceptible to *Clemora Smithi* grubs. It arrows little, gives excellent yields in plant canes, but yields fall away somewhat rapidly in ratoons. The canes maintain their quality late into the harvesting season. In the areas most suitable to it, it is superior to M.134/32 and one large estate has 2,000 acres of this variety as compared to 1,000 acres of M.134/32. It has excellent factory qualities, the juice is of high purity, very easy to work, sucrose content is good, per cent fibre is satisfactory and the burning quality of the bagasse is good.

*M.134/32.* Very rapid growth, respor markedly to fertilizer applications particularly to Nitrogen ; resists cyclones and drought admirably. Considerable supplying needs due to Pineapple disease in the drier parts of the North have been obviated by the use of Aretan. Somewhat susceptible to Red Rot when damaged by cyclone and borer. From second ratoons onwards there is a tendency for the canes to be somewhat thinner, arrowing is fairly heavy. In the Black River district its appearance is said to be deceptive and actual weights fall below expected weights. In most districts it covers the ground rapidly, reduces weeding costs. It may produce 30–35 tons of cane in 11–12 months, matures early but may lose weight when harvested late. Its factory qualities are good, sucrose is high, frequently requires more settling capacity and in a few instances defecation of the juice has presented some difficultly. This variety is generally regarded as having benefitted the Sugar Industry of Mauritius in a similar manner to the famous P.O.J.2878 cane in Java.

*M.112/34.* Stated to be particularly suitable for the hot irrigated areas of the coastal districts and under these conditions gives good yields. It is not a drought resistant variety and with inadequate moisture the canes are reported to be somewhat thin. It appears to be particularly susceptible to Pineapple disease and even after treatment with Aretan, germination is frequently somewhat erratic. It is severely attacked by borer and is susceptible to red rot disease in the cooler districts. It is somewhat susceptible to white grubs *(Clemora Smithii)*. When the cane is healthy and yields are good, as in the restricted localities particularly suited to it, the sucrose content and factory characteristics are excellent. Under less favourable conditions, the juice is stated to ferment—probably as a result of borer attack followed by red rot incidence. It is unlikely that the cultivation of this variety will be extended beyond those regions which experience has shown it to be particularly suited for viz., the irrigated areas of Black River and the wetter, warmer regions of Flacq, Savanne and the North.

## The varieties M.165/38, M.63/39 and M.76/39

These varieties were released for trial on a commercial scale at the end of 1945. Owing to insufficient data about their factory characteristics, planters were requested to go slow with the propagation of these varieties until more analytical data were available. At the instigation of the Acting Director of Agriculture, controlled factory tests were made by the Sugar Technology Division during the current harvesting season, and, in addition the results of further field trials have become available.

On the field side, it has been confirmed that these varieties are vigorous and high yielding and are resistant to most of the diseases occurring in the island with the exception of chlorotic streak to which they appear to be somewhat susceptible but tolerant. Cuttings infected with chlorotic streak frequently fail to germinate. It is, of course, possible to control this disease by warm water treatment of the cuttings and when plantations are being started from a small nucleus this is practicable.

The variety M.63/39 is highly resistant to Pineapple disease, the varieties M.165/38 and M. 76/39 are susceptible but tolerant and infected cuttings frequently produce healthy stools. This is in marked contrast to the variety M.112/34 which in addition to being highly susceptible also shows almost 100 per cent. mortality of infected cuttings. Preliminary data indicate that all three varieties are resistant to the white grub *Clemora Smithii*. It is possible that the varieties M.63/39 and M.165/38 may be somewhat more resistant than the variety M.76/39.

In the following tables the results of the factory tests mentioned above and also the analytical data from field trials harvested during 1947 are presented—

| *M 165/38—Factory tests* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Locality where grown* | | *Category and Age in months* | *Date of analysis* | *Yield of cane in tons per arpent* | *Purity of 1st Expressed juice* | *Glucose ratio of mixed juice* | *Fibre % cane* | *Richesse* | *C.S.S* | |
| | | | | | | | | | *% cane* | *Tons per arpent* |
| Savinia S.E. ... ... | | Virgins (11½) | 31.7.47 | 54·1 | 78·8 | 7·5 | 12·5 | 10·91 | 8·27 | 4·47 |
| do. | M. 134/32 ... | do. (12½) | ,, | 26·8 | 90·4 | 2·9 | 12·9 | 13·76 | 11·94 | 3·20 |
| Rich Fund S.E. ... | — | 2nd ratoons (13) | 5.8.47 | 30·4 | 85·4 | — | 10·6 | 12·96 | 10·94 | 3.33 |
| Mon Repos S.E. ... | — | Virgins (16) | 7.8.47 | 78·5 | 87·7 | — | 14·2 | 12·35 | 10·37 | 8·14 |
| Tamarind S.E. ... | — | Virgins (12) | ,, | 38·4 | 84·0 | 7·4 | 13·9 | 12·23 | 10·18 | 3·91 |
| do. | | 1st ratoons (14) | 11.9.47 | 34·1 | 87·4 | 3·9 | 14·0 | 12·72 | 10·54 | 3·59 |
| do. | M 134/32 ... | do. (14) | ,, | 47·6 | 92·4 | 1·1 | 12·5 | 15·13 | 13·28 | 6.32 |
| Trois Ilots ... ... | | 1st ratoons (14½) | 2.10.47 | 49·4 | 87·9 | — | 12·9 | 13·32 | 11·38 | 5·62 |
| do. | M 134/32 ... | do. (14½) | ,, | 37·8 | 90·2 | 3·0 | 11·3 | 14·32 | 12·71 | 4·80 |
| La Mivoie ... ... | | — | 30.10.47 | 47·0 | 85·2 | — | 13·3 | 12·70 | 10·43 | 4·91 |
| do. | M 134/32 ... | — | ,, | — | 91·4 | — | 11·3 | 15·54 | 13·74 | — |
| Beau Plan ... ... | | — | 7.11.47 | — | 86·5 | — | 12·8 | 14·10 | 11·71 | — |
| do. | M 134/32 ... | — | ,, | — | 89·8 | — | 12·9 | 14·99 | 12·88 | — |
| Grande Rosalie ... | | Virgins (17½) | 21.9.47 | 27·0 | 89·5 | — | — | 16·28 | 14·18 | 3·83 |
| do. ... | ...M 134/32 ... | do. (17½) | ,, | 28·4 | 93·0 | — | — | 16·89 | 15·18 | 4·31 |
| Means M 165/38 ... | ... ... | (Factory test) | — | 44·9 | 85·8 | — | 13·02 | 13·06 | 10·89 | 4·72 |
| Means M 134/32 ... | ... ... | do. | — | 35·2 | 91·2 | — | 12·2 | 15·10 | 13·29 | 4.66 |
| *M 165/38—Variety trials* | | | | | | | | | | |
| Rivière des Anguilles | | 2nd ratoons (12) | 25.11.47 | 38·7 | 86· 8 | — | 10· 9 | 17·60 | 15·60 | 6·04 |
| do. | M 134/32 ... | do. | ,, | 29·6 | 87· 9 | — | 9· 3 | 18·40 | 16·60 | 4·92 |
| Constance S.E. ... | | 2nd ratoons (9⅓) | 18.8.47 | 39·1 | 72· 8 | — | 10· 1 | 11·71 | 8· 9 | 3·47 |
| do. | M 134/32 ... | do. | ,, | 32·6 | 78· 9 | — | 10· 9 | 13·56 | 11· 0 | 3·58 |
| Rich Fund S.E. ... | | 2nd ratoons (13½) | 25.9.47 | 28·1 | 82· 8 | — | 10· 1 | 14·15 | 12· 1 | 3·40 |
| do. | M 134/32 ... | do. | ,, | 33·4 | 82· 8 | — | 9· 6 | 13·80 | 11· 8 | 3·94 |
| Rose Belle S.E. ... | | 1st ratoons (11) | 19.9.47 | 31·2 | 85· 8 | — | 10· 7 | 14·11 | 12· 4 | 3·87 |
| do. | M 134/32 ... | do. | ,, | 33·7 | 85· 2 | — | 10· 4 | 14·30 | 12· 5 | 4·21 |
| Pierrefonds S.E. ... | | 1st ratoons (11) | 10.9.47 | 34·5 | 85· 4 | — | 10· 1 | 15·40 | 13· 5 | 4·66 |
| do. | M 134/32 ... | do. | ,, | 30·5 | 86· 9 | — | 9· 8 | 15·92 | 14· 2 | 4·33 |
| Riche-en-Eau S.E. ... | | 1st ratoons (10½) | 14.10.47 | 31·0 | 81· 7 | — | 10· 5 | 14·46 | 12· 1 | 3·75 |
| do. | M 134/32 ... | do. | ,, | 26·6 | 85· 4 | — | 10· 1 | 16·25 | 14· 2 | 3·77 |
| Bel Ombre S.E. ... | | Virgins (12) | 3.12.47 | 42·3 | 84· 0 | — | 12· 3 | 15·72 | 13· 4 | 5·66 |
| do. | M 134/32 ... | do. | ,, | 27·7 | 84· 2 | — | 11· 5 | 17·31 | 14· 9 | 4·13 |
| Means M 165/38 ... | ... ... | (Field trials) | — | 35·0 | 82·76 | — | 10·67 | 14·74 | 12·57 | 4·41 |
| Means M 134/32 ... | ... ... | do. | — | 30·6 | 84·47 | — | 10·23 | 15·65 | 13·60 | 4·12 |

NOTE—Purity in factory tests is recorded for first expressed juice and in variety trials for absolute juice.

*M 63/39—Factory tests*

| Locality where grown | Category and Age in months | Date of analysis | Yield of cane in tons per arpent | Purity of 1st Expressed juice | Glucose ratio of mixed juice | Fibre % cane | Richesse | C.C.S. % cane | C.C.S. Tons per arpent |
|---|---|---|---|---|---|---|---|---|---|
| Rich Fund ... ... ... ... | 2nd ratoons (13) | 5. 8.47 | 38·6 | 83·4 | 5·7 | 11·6 | 11·82 | 9·82 | 3·79 |
| do. M 134/32 ... | do. (13) | ,, | 27·8 | 88·1 | — | 11·2 | 13·49 | 11·69 | 3·25 |
| Mon Repos ... ... ... ... | Virgins (16) | 7. 8.47 | 65·2 | 82·0 | — | 13·0 | 10·74 | 8·47 | 5·52 |
| do. M 134/32 ... | do. (16) | ,, | 43·8 | 89.0 | — | 11·7 | 13·59 | 11·69 | 5·12 |
| Tamarin ... ... ... ... | 1st ratoons (14) | 11. 9.47 | 66·7 | 88·9 | 3·8 | 13·4 | 13·60 | 11·48 | 7·66 |
| do. M 134/32 ... | do. (14) | ,, | 47·6 | 92·4 | 1·1 | 12·5 | 15·13 | 13·28 | 6·32 |
| Trois Ilots ... ... ... ... | 1st ratoons (14½) | 2.10.47 | 45·7 | 86·9 | 4·6 | 12·8 | 12·51 | 10·58 | 4·83 |
| do. M 134/32 ... | do. (14½) | ,, | 37·8 | 90·2 | 3·0 | 11·3 | 14·32 | 12·71 | 4·80 |
| La Mivoie ... ... ... ... | — | 30.10.47 | 46·0 | 86·3 | — | 11·3 | 12·20 | 10·25 | 4·72 |
| do M 134/32 ... | — | ,, | — | 91·4 | — | 11·3 | 15·51 | 13·74 | — |
| Grande Rosalie ... ... ... | Virgins (17½) | 21.11.47 | 30·9 | 90·9 | — | — | 16·22 | 14·31 | 4·42 |
| do. M 134/32 ... | do. (17½) | ,, | 28·4 | 93·0 | — | — | 16·89 | 15·18 | 4·31 |
| Means M 63/39 (Factory tests) ... | — | — | 48·8 | 86·4 | — | 12·4 | 12·85 | 10·82 | 5.16 |
| Means M 134/32 ( do. ) ... | — | — | 37·1 | 90·7 | — | 11·6 | 14·83 | 13·05 | 4·76 |

*M 63/39—Variety Trials*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rivière des Anguilles ... ... | 2nd ratoons (12) | 26.11.47 | 33·5 | 88· 4 | — | 11· 4 | 17·67 | 15·80 | 5·29 |
| do. M 134/32 ... | do. | ,, | 29·6 | 87· 9 | — | 9· 3 | 18·40 | 16·60 | 4·92 |
| Constance S.E. ... ... ... | 2nd ratoons (9⅓) | 18. 8.47 | 40·9 | 79· 2 | — | 11· 3 | 13·29 | 10· 8 | 4·41 |
| do. M 134/32 ... | do. | ,, | 32·6 | 78· 9 | — | 10· 9 | 13·56 | 11· 0 | 3·58 |
| Rich Fund ... ... ... ... | 2nd ratoons (13½) | 25. 9.47 | 37·7 | 86· 7 | — | 10· 6 | 15·24 | 13·50 | 5·08 |
| do. M 134/32 ... | do. | ,, | 33·4 | 82· 8 | — | 9· 6 | 13·80 | 11·80 | 3·94 |
| Mon Désert S.E. ... ... ... | 2nd ratoons (13½) | 16. 9.47 | 47·9 | 84· 7 | — | 10· 3 | 15·08 | 13· 1 | 5·40 |
| do. M 134/32 ... | do. | ,, | 36·0 | 85· 2 | — | 10· 1 | 14·77 | 12·90 | 4·60 |
| St. Antoine S.E. ... ... ... | 1st ratoons (13½) | 27.11.47 | 18·1 | 87· 3 | — | 12· 0 | 16·64 | 14·70 | 2·65 |
| do. M 134/32 ... | do. | ,, | 14·2 | 86· 8 | — | 11· 2 | 17·46 | 15·40 | 2·19 |
| Rose Belle S.E. ... ... ... | 1st ratoons (11) | 19. 9.47 | 37·3 | 84· 8 | — | 12· 2 | 13·42 | 11.60 | 4·33 |
| do. M 134/32 ... | do. | ,, | 33·7 | 85· 2 | — | 10· 4 | 14· 3 | 12· 5 | 4·21 |
| Pierrefonds S.E. ... ... ... | 1st ratoons (11) | 10. 9.47 | 41·1 | 85· 3 | — | 12· 0 | 14·52 | 12· 6 | 5·18 |
| do. M 134/32 ... | do. | ,, | 30·5 | 86. 9 | — | 9· 8 | 15·92 | 14· 2 | 4·33 |
| Riche en Eau S.E. ... ... ... | 1st ratoons (10½) | 14.10.47 | 30·6 | 85· 2 | — | 10· 7 | 15·90 | 13.80 | 4·22 |
| do. M 134/32 ... | do. | ,, | 26·6 | 85. 4 | — | 10· 1 | 16·25 | 14·20 | 4·33 |
| Bel Ombre S.E. ... ... ... | Virgins (12) | 3.12.47 | 34·6 | 83· 6 | — | 11· 4 | 17·17 | 14· 7 | 5.09 |
| do. M 134/32 ... | do. | ,, | 27 7 | 84· 2 | — | 11· 5 | 17·31 | 14· 9 | 4·13 |
| Means M 63/39 (Field trials) ... | — | — | 35·7 | 85·02 | — | 11·32 | 15·44 | 13·40 | 4·63 |
| Means M 134/32 ( do. ) ... | — | — | 29·4 | 84· 8 | — | 10·32 | 15·75 | 13·61 | 3·85 |

NOTE—Purity in factory tests is recorded for first expressed juice and in variety trials for absolute juice.

| *M 76/39—Factory Tests* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Locality where grown* | *Category and Age in months* | | *Date of analysis* | *Yield of cane in tons per arpent* | *Purity of 1st expressed juice* | *Glucose ratio of mixed juice* | *Fibre % cane* | *Richesse* | *C.C.S.* | |
| | | | | | | | | | *% cane* | *Tons per arpent* |
| Savinia ... ... ... ... | Virgins | (11½) | 31. 7.47 | 47· 6 | 80· 9 | 10·2 | 11· 3 | 10·89 | 8·33 | 3·97 |
| do. M 134/32 ... | do. | (12½) | ,, | 26· 8 | 90· 4 | 2·9 | 12· 9 | 13·76 | 11·94 | 3·20 |
| Rich Fund ... ... ... ... | 2nd ratoons | (13) | 5. 8.47 | 39· 0 | 86· 7 | 4·2 | 13· 4 | 12·02 | 10·96 | 4·27 |
| do. M 134/32 ... | do. | | ,, | 27· 8 | 88· 1 | — | 11· 2 | 13·49 | 11·69 | 3·25 |
| Mon Repos ... ... ... ... | Virgins | (16) | 7. 8.47 | 59· 4 | 82· 3 | — | 11· 0 | 11·84 | 9·47 | 5·62 |
| do. M 134/32 ... | do. | | ,, | 43· 8 | 89· 0 | — | 11· 7 | 13·59 | 11·69 | 5·12 |
| Tamarin ... ... ... ... | Virgins | (12) | 7. 8.47 | 41· 4 | 85· 9 | 5·5 | 11· 5 | 12·89 | 11·03 | 4·56 |
| do. M 134/32 ... | do. | | ,, | 40 1 | 89· 6 | — | 13· 4 | 13·51 | 11·53 | 4·62 |
| Tamarin ... ... ... ... | 1st ratoons | (14) | 11. 9.47 | 49· 1 | 89· 4 | 3·6 | 12· 5 | 14·21 | 12·12 | 5·95 |
| do. M 134/32 ... | do. | | ,, | 47· 6 | 92· 4 | 1·1 | 12· 5 | 15·13 | 13·28 | 6·32 |
| Trois Ilots ... ... ... ... | 1st ratoons | (14½) | 2.10.47 | 45· 5 | 88· 4 | — | 11· 9 | 14·43 | 12·46 | 5·67 |
| do. M. 134/32 ... | do. | | ,, | 37· 8 | 90· 2 | 3·0 | 11· 3 | 14·32 | 12·71 | 4·80 |
| La Mivoie ... ... ... ... | — | | 30.10.47 | 40· 0 | 90· 4 | — | 11· 7 | 15·38 | 13·46 | 5·38 |
| do. M. 134/32 ... | — | | ,, | — | 91· 4 | — | 11· 3 | 15·54 | 13·74 | — |
| Grande Rosalie ... ... ... | Virgins | (17½) | 21.11.47 | 34· 4 | 90· 0 | — | — | 16·02 | 14·02 | 4·82 |
| do. M 134/32 ... | do. | | ,, | 28· 4 | 93· 0 | — | — | 16·89 | 15·18 | 4·31 |
| Terracine ... ... ... ... | Virgins | | 26.11.47 | — | 86· 2 | — | 11· 0 | 15·43 | 13·01 | - - |
| Rivière des Anguilles ... ... | Virgins | (14) | — | — | 90· 1 | — | — | 15·33 | 13·44 | — |
| do. M 134/32 ... | do. | | — | — | 91· 1 | — | — | 15·83 | 14·01 | — |
| Means M 76/39 (Factory tests) ... | — | | — | 44· 5 | 87·03 | - | 11· 8 | 13·90 | 11·83 | — |
| Means M 134/32 (do.) ... | do. | | — | 36· 0 | 90· 6 | — | 12·04 | 14·67 | 12·86 | — |
| *M 76/39—Variety Trials* | | | | | | | | | | |
| Rivière des Anguilles ... ... | 2nd ratoons | (12) | 26.11.47 | 37· 4 | 86· 2 | — | 11· 3 | 17·77 | 15· 1 | 5·64 |
| do. M 134/32 ... | do. | | ,, | 29· 6 | 87· 9 | - | 9· 3 | 18·40 | 16· 6 | 4·92 |
| Constance S.E. ... | 2nd ratoons | (9⅓) | 18. 8.47 | 36· 4 | 79· 1 | — | 10· 9 | 13·57 | 11· 1 | 4·04 |
| do. M 134/32 ... | do. | | ,, | 32· 6 | 78· 9 | — | 10· 9 | 13 56 | 11· 0 | 3·58 |
| Rich Fund S. E. ... ... ... | 2nd ratoons | (13½) | 25. 9.47 | 37· 2 | 83· 5 | — | 11· 7 | 14·21 | 12· 1 | 4·50 |
| do. M 134/32 ... | do | | ,, | 33· 4 | 82· 8 | — | 9· 6 | 13·80 | 11· 8 | 3·94 |
| Mon Desert S. E. ... ... ... | 2nd ratoons | (13½) | 16. 9.47 | 39· 4 | 82· 0 | — | 10· 6 | 13·73 | 11· 6 | 4·60 |
| do. M 134 32 ... | do. | | ,, | 36· 0 | 85· 2 | — | 10· 1 | 14·77 | 12· 9 | 4·60 |
| St. Antoine S. E. ... ... ... | 1st ratoons | (13½) | 27.11.47 | 18· 7 | 87· 8 | — | 11· 0 | 16·82 | 15· 0 | 2·80 |
| do. M 134/32 ... | do. | | ,, | 14· 2 | 86· 8 | — | 11· 2 | 17·46 | 15· 4 | 2·19 |
| Rose Belle S E. ... ... ... | 1st ratoons | (11) | 19. 9.47 | 32· 4 | 83· 0 | — | 11· 3 | 13 13 | 11· 2 | 3·63 |
| do. M 134/32 ... | do. | | ,, | 33· 7 | 85· 2 | — | 10· 4 | 14·30 | 12· 5 | 4·21 |
| Pierrefonds S.E. ... ... ... | 1st ratoons | (11) | 10. 9.47 | 33· 3 | 86· 1 | — | 10· 8 | 14·89 | 13· 1 | 4·36 |
| do. M 134/32 ... | do. | | ,, | 30· 5 | 86· 9 | — | 9· 8 | 15·92 | 14· 2 | 4·33 |
| Riche en Eau S.E. ... ... ... | 1st ratoons | (10½) | 14.10.47 | 24· 6 | 82· 1 | — | 10· 2 | 15·50 | 13· 1 | 3·22 |
| do. M 134/32 ... | do. | | ,, | 26· 6 | 85· 4 | — | 10· 1 | 16·25 | 14· 2 | 3·77 |
| Bel Ombre S.E. ... ... . . | Virgins | (12) | 3.12.47 | 33· 8 | 84· 7 | — | 10· 9 | 16·76 | 14· 5 | 4·87 |
| do. M 134/32 ... | do | | ,, | 27· 7 | 84· 2 | - | 11· 5 | 17·31 | 14· 9 | 4·13 |
| Means M 76/39 (Field trials) ... | — | | — | 32· 6 | 83·83 | — | 10·97 | 15·15 | 12.98 | 4·19 |
| Means M 134/32 (do.) ... | — | | — | 29· 4 | 84·81 | — | 10·32 | 15·75 | 13·72 | 3·96 |

NOTE—Purity in factory tests is recorded for first expressed juice and in variety trials for absolute juice.

It is considered that the data on these varieties obtained in the year 1947, together with data previously available justify the following conclusions—

*Yield of cane.*—These three varieties may be expected to give higher yields of cane than the variety M.134/32 ; the average increases in yield of cane per arpent in 1946 and 1947 trials over M.134/32 are 4·5 tons, 6 tons and 3·0 tons for the varieties M.165/38, M.63/39 and M.76/39 respectively.

*Purity of Juice.*—The purity of the juice is lower in the three varieties than in the standard M.134/32: there is evidence that the purity may be somewhat higher in M.63/39 than in the other two varieties.

*Fibre content.*—M.165/38 and M.63/39 have a slightly higher fibre content than M.134/32, that of M.76/39 is about equal to the standard.

*Sucrose and commercial cane sugar per cent. cane.*—The three varieties are invariably lower in sucrose than M.134/32. The difference is most pronounced when short season canes are harvested early in the milling season. For 15–18 month virgins and ratoons harvested later than October 1st the difference is not so marked being somewhat lower than 1 per cent. on an absolute basis. There is little to choose between the three varieties with respect to sucrose content. It seems apparent from the data available that reasonably satisfactory juices are obtained if harvesting is delayed until October-November. As in addition to having a lower sucrose and commercial cane sugar content per cent. cane than the variety M. 134/32 they also mature later, late harvesting seems to be an essential desideratum in the commercial production of these varieties.

*Commercial cane sugar per arpent.*—There is little doubt that, providing the conditions stated in the previous paragraph are adhered to, these varieties will produce a higher tonnage of sugar per arpent than M.134/32. The best in this respect is M.63/39 which, from the data available may be expected to produce an increase of ½ ton of sugar per arpent over M.134/32.

*Commercial possibilities.*—In view of the great dependence of the Sugar Industry on the single variety M.134/32, which now occupies 80 per cent. of the total area under cane, it seems well worth while to plant a restricted acreage of one or other of these varieties as an insurance against possible failure of M.134/32. In this event arrangements should be made to harvest these canes in October–November, when the increased sugar per acre would probably compensate for the higher transport and manufacturing costs. These varieties are also very suitable for suppressing bad weeds—their vigorous growth and quick cover results in partial or complete suppression of bad weeds and this is probably the cheapest method of overcoming infestation by bad weeds which are resistant to chemical control.

## Resistance of Mauritius Sugarcane seedlings to diseases occurring in the Island of Réunion

By an arrangement concluded between the Director of Agriculture and the Station Agronomique of Réunion Island information has been made available on the behaviour of Sugarcane Research Station seedlings in relation to mosaic disease in particular. The variety M.134/32 is now cultivated on a large scale in Réunion in areas normally heavily infected with mosaic disease. It has so far shown complete immunity.

Of the varieties despatched in January 1946, viz., M.112/34, M.165/38, M.63/39 and M.76/39, the variety M.76/39 contracted mosaic disease in September, 1947—nine months after being planted in an infected area. The other varieties are not affected, but it is too early to gauge the degree of resistance at this stage.

M.165/38 was stated to be severely affected by Pokkah Boeng.

### Varieties introduced from abroad

The six Barbados varieties introduced from Trinidad B.W.I. made satisfactory growth in the field at Réduit. Three field trials were laid down, viz., at Pamplemousses Experiment Station, Central Experiment Station, Réduit and Plaines Wilhems Experiment Station, Hermitage, respectively. In addition, two or three estate field trials as long season virgins are being laid down in January, 1948, and these will be followed by further estate field trials in May–June, 1948. It is hoped that sufficient data on these varieties will be available by the 1949 crushing season to appraise their value for commercial production in Mauritius.

Cuttings of the Canal Point varieties C.P.34/120, C.P.36/13 and C.P.36/105 arrived in Mauritius in December 1947, and are now being propagated in the quarantine greenhouse.

At the time of writing cuttings of the famous Hawaiian variety 32–8560 and the Queensland variety Q28 have been received and have been planted in the quarantine greenhouse.

No crossing work could be carried out with imported cane varieties as none of the Barbados seedlings have yet flowered.

It is hoped that the introduction of well tested commercial varieties from abroad together with the seedling selection work at the new Plaines Wilhems Station will facilitate selection of suitable varieties for the high rainfall areas of the Island. Heavy yielding varieties of good sucrose content for this type of environment is the most urgent requirement at present. It is already apparent that selection work at the Paines Wilhems Station will prove considerably easier than at Réduit and Pamplemousses as unsuitable seedlings for this environment make very little growth and may even fail to survive.

### Staff and Administration

It had been hoped that the return of staff from leave and from war-time duties would enable the work of the Station to proceed at a high tempo, but this hope has been far from realised. On the contrary, the work of the Station has been handicapped by a most critical shortage of staff.

Following the departure on leave prior to retirement, of the Director of Agriculture on 3rd March, 1947, Mr. N. Craig, Head of the Chemical Division and Officer in charge of the Research Station left the Station to become Acting Director of Agriculture. This Officer who was a member of the staff of the Station since its inception has recently been selected for an administrative post outside the Station.

On the assumption of duties as Acting Director of Agriculture by the Officer in charge of the Sugarcane Research Station, the Botanist of the Station, Dr. H. Evans, was appointed Acting Officer in charge.

Mr. G. C. Stevenson, the Geneticist of the Station who left the Colony on leave on 5th April, 1946, subsequently was transferred to a post in British Guiana, and Mr. G. Mazery, Assistant Geneticist, has been Acting Geneticist throughout the year.

As from the beginning of 1948, Mr. A. de Sornay, who was associated with the Station for many years as Cane Breeding Officer, will assume duties as Acting Geneticist. As from this date also, Mr. G. Mazery will commence duties as Senior Field Demonstrator. Mr. P. Halais who had been Assistant in the Chemical Division of the Station since its inception, was granted three months vacation leave on the 12th January, 1947, and resigned from Government to take a post in the Sugar Industry at the expiration of his leave.

There has thus been no staff in the Chemical Division of the Station for most of the year. Mr. S. Feillafé continued to act as Assistant Botanist throughout the year.

Two additional Field Demonstrators, Messrs. Avice and Sooïtangos, assumed duty on 1st June, 1947, thus bringing the number of Field Demonstrators for instruction work amongst small planters to three. Mr. Marot was assigned to the Pamplemousses-Rivière du Rempart districts, Mr. Sooïtangos to the districts of Grand Port and Savanne and Mr. Avice to the districts of Moka–Flacq. This arrangement is provisional pending the appointment of the full complement of seven Field Demonstrators.

There is little doubt that these Field Demonstrators have a field before them in which great progress can be made. The standard of cultivation amongst the small planters is low and the demonstration of better cultural and fertilizer practices and the introduction of suitable cane varieties will undoubtedly result in large increases in the production of sugar by this section of the Sugar Industry.

Unfortunately, shortage of staff at the Station itself made it necessary to recruit the services of the Field Demonstrators for the harvesting of the large number of field trials in progress and for analytical work in connection with these but as from the beginning of 1948, their full time will be devoted to instruction and extension work amongst the small planters.

It is hoped that the latter community will co-operate and fully utilize the services of the Demonstrators.

The programme of work of the Genetical Division has been very ably carried out by Mr. G. Mazery who has accomplished the year's breeding programme and trials for testing new seedlings. Some of the seedlings which have been through extensive tests show considerable promise, but further information particularly on ratooning behaviour is required before these can be released for commercial cultivation.

The field work of the Chemical Division, which included twenty factorial trials on fertilizer problems and Foliar diagnosis technique has been continued by the staff of the Botanical Division, assisted by the Field Demonstrators during the harvesting season.

The Botanical Division has continued its work on weed control, the use of organo-mercurial compounds, and has undertaken pot and field experimentation on the value of basaltic rock dust on the poorer soils of the wetter districts. In association with this investigation, work on possible micro-element deficiencies is also in progress.

The Acting Officer in charge of the Station was responsible under the general direction of the Director of Agriculture for the administration of the scheme of payment of bonus for replanting in sugarcane, lands diverted to foodcrops during the war, and the organization of test checks in this connection. This work has now been completed.

Two meetings of the Sugarcane Research Station Advisory Committee were held during the year, the first on 6th May, 1947, to discuss the Annual Report of the Station for 1946 and the Research Programme for 1947, and the second on 20th November, 1947, to discuss the progress of the Research Programme, staff shortage and other matters.

In the fourth quarter of the year under review an Economic Commission on the lines of the ' Working Parties ' organized in Great Britain during and after the war commenced a thorough investigation of the Agricultural and Economic systems in operation in the Island. The writer has been associated with the Commission in the role of assessor to the Sub-committees investigating the agricultural side of the Sugar Industry and of secondary agricultural crops.

Close co-operation has been maintained with the planting Community. There is little doubt that the Planters fully appreciate the work that the Station has accomplished, and are most anxious that the staff of the Station be brought to full strength as soon as possible.

H. Evans—*Botanist,*
*Ag. Officer-in-charge,*
*Sugarcane Research Station.*

# PART I—GENETICIST DIVISION

## Cane Breeding

A very favourable arrowing season enabled the crossing programme to be carried out as contemplated except for a few crosses which could not be made on account of scarcity of arrows in the required parent varieties. None of the recently imported West Indian varieties produced arrows and consequently no crosses could be attempted with them.

One hundred and sixty crosses were made at Réduit and forty-five at Pamplemousses Experiment Station, i.e., in the aggregate 205 crosses. The germination of the fuzz was very good on the average although the fertility of the seeds was markedly lower at the end of the season. A summary of the breeding work is given in Table I below—

TABLE I

| | *No. of crosses made* | *No. of seedlings obtained* | *No. of seedlings transplanted* | | |
|---|---|---|---|---|---|
| | | | *C.E.S.* | *P.E.S.* | *P.W.E.S.* |
| 1. Noble Cane Breeding ... .... | 4 | 2,500 | 265 | — | 1,005 |
| 2. Nobilization of *S. spontaneum* (Java): | | | | | |
| (*a*) 3rd Nobilization... ... ... | 4 | 294 | 66 | — | 156 |
| (*b*) 4th ,, ... ... ... | 29 | 3,939 | 367 | 961 | 426 |
| (*c*) 5th ,, ... ... ... | 20 | 4,596 | 558 | 376 | 1,148 |
| (*d*) Mixed "glagah" crosses ... | 9 | 2,197 | 340 | 116 | 680 |
| 3. Nobilization of *S. spontaneum* (India): | | | | | |
| (*a*) 2nd Nobilization ... ... | 4 | 229 | 82 | — | 45 |
| (*b*) 3rd ,, ... ... ... | 5 | 158 | 19 | — | 40 |
| 4. Nobilization of *S. barberi*— Mixed barberi crosses ... ... | 10 | 133 | 75 | 22 | — |
| 5. Nobilization of *S. robustum*— | | | | | |
| (*a*) 1st Nobilization ... ... | 1 | 0 | — | — | — |
| (*b*) 2nd ,, ... ... ... | 1 | 2,000 | 126 | — | — |
| 6. Crosses involving several *Saccharum* species— | | | | | |
| (*a*) *S. officinarum*, *S. spontaneum*, (Java), *S. spontaneum*, (India)... | 96 | 37,005 | 4,221 | 4,139 | 4,977 |
| (*b*) *S. officinarum*, *S. spontaneum*, (Java), *S. barberi*. ... ... | 11 | 4,466 | 415 | 782 | 423 |
| (*c*) *S. officinarum*, *S. spontaneum* (Java), *S. spontaneum* (India), *S. robustum* ... .. ... | 2 | 385 | 38 | — | 193 |
| (*d*) *S. officinarum*, *S. spontaneum* (Java), *S. spontaneum* (India), *S. barberi* ... ... ... | 3 | 2,000 | — | 487 | — |
| (*e*) *S. officinarum*, *S. spontaneum* (Java), *S. robustum* ... | 6 | 1,408 | 114 | — | 400 |
| TOTAL ... | 205 | 61,310 | 6,686 | 6,883 | 9,493 |

There has been no change in the breeding methods. The seedlings planted out in the field at Plaines Wilhems Experiment Station were transferred in the pot stage from the Central Experiment Station, as was done last year, no nursery equipment being available there yet for the handling of seedlings at earlier stages.

Unfortunately full advantage could not be taken of the unusually satisfactory growth made by the seedlings up to the pot stage because the planting out in the field was delayed on account of shortage of irrigation water.

The testing of a certain number of crosses in special randomized blocks has now been adopted as a routine practice.

## First Year Trials

*(a) Virgins M/46 series.*—The seedlings of this series planted out at Plaines Wilhems Experiment Station had made very irregular growth due partly to a severe attack of cut worms and pink borers and partly to the unfavourable growth conditions generally experienced in that locality (poor soil, high rainfall, low temperature) and as a result there has been a considerable increase in the variability of the seedlings in and between the crosses. This will render the selection work easier but will, at the same time, introduce a source of error through increased interaction between adjacent seedlings. The seedlings at this Station will be selected in July–August 1948.

At the two other Stations, selection was carried out at the end of the crop. At Réduit, 119 seedlings were selected from a population of 7,583 seedlings or approximately 1·6 per cent.; at Pamplemousses, the corresponding figures were 94 from 6,104 seedlings or approximately 1·5 per cent.

*(b) Ratoons. M/45 series.*—The selection from the ratoon crop of the 1945 seedlings was carried out at Réduit and Pamplemousses Experiment Stations. 104 seedlings were selected from a population of 5,920 or approximately 1·7 per cent. and 38 from a population of 2,735 or approximately 1·4 per cent. at these two Stations respectively.

The randomized blocks planted for testing the relative merits of various crosses made in 1945 and 1946, have been harvested at both Stations. The results of these trials will be the subject of a special publication.

## Second Year Trials

Seven trials were planted at Réduit ; these included thirty-six varieties of the M./43 series—ratoon selections—and thirty-three of the M./44 series—virgin selections. These varieties were also tested simultaneously in trials at Plaines Wilhems Experiment Station. At Pamplemousses, thirteen trials were planted for testing one hundred and twenty varieties of the M./44 series of which fifty-nine were virgin selections and sixty-one ratoon selections.

Thirteen trials which had been reaped in virgins or plant cane in 1946 at Réduit and Pamplemousses were harvested in ratoons during the last crop. No new selections were made from these trials at Réduit while five varieties were retained at Pamplemousses for further trial.

At Réduit, thirteen varieties, including one for breeding purposes, were selected from eight trials harvested as virgins. At Pamplemousses five trials were harvested in virgins from which nine selections were made.

## Third Year Trials

Two trials have been harvested at Réduit at the end of November. One included six M./40 varieties none of which were particularly outstanding. The other included ten varieties bred by Ebene S.E., which the Manager of that Estate considered worthy of propagation. Unfortunately the cane from several plots in this trial were pilfered for eating purposes and no reliance may be placed on the results. However the very high sucrose content of some of these varieties indicate that they may prove valuable for commercial cultivation. The most promising of these varieties will be tested under Estate conditions in 1948.

At Pamplemousses three trials were reaped in virgins. One variety of the M./41 series and two of the M./42 series were retained from these trials for further testing. Three trials were reaped in first ratoon stage and the results bear out those obtained in virgins. Three trials were planted at Réduit, two at Pamplemousses and two at Plaines Wilhems Experiment Station. One variety of the M./40 series, thirty-two of the M./41, six of the M./42 and five of the M./43 series are being tested in these trials.

## Variety Trials

Sixteen trials were harvested on Estates during the crop. Nine of them included the varieties M.165/38, M.63/39 and M.76/39 ; the results of these trials have been presented in the general part of this report.

The results of the five varieties tested in the other seven trials are given in Table II, the standard being M 134/32 in each trial.

| | *Localities* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Union (Ducray)* | *Labourdonnais* | *Savinia* | *Mon Loisir* | *St. Aubin* | *Bénarès* | *Bel Ombre* |
| Category ... ... ... ... | Virgins | Virgins | Virgins | Virgins | Virgins | Virgins | Virgins |
| M 171/40 : | | | | | | | |
| Tons cane per arpent | ... +1·*†3±10·5 | −2·4±5·6 | — | −6·7±4·6 | +0·2±5·2 | **+9·9**±7·5 | **+8·2**±2·8 |
| C.C.S. per cent. cane | ... + 0.6 | −1·0 | — | −0·3 | −1·0 | +0·9 | −0·5 |
| Tons C.C.S. per arpent | ... +0·40± 1·22 | −0·62±0·76 | — | −0·99±0·59 | −0·36±0·64 | **+1·57**±0·86 | **+0·75**±0·40 |
| M 204/40 : | | | | | | | |
| Tons cane per arpent | ... +3·5±10·5 | −2·1±5·6 | — | −2·5±4·6 | **+9·6**±5·2 | **+14·4**±7·5 | -- |
| C.C.S. per cent. cane | ... + 0·4 | −0·5 | — | −0·5 | −3·1 | −0·5 | — |
| Tons C.C.S. per arpent | ... +0·58±1·22 | −0·44±0·76 | — | −0·52±0·59 | −0·18±0·64 | **+1·41**±0·86 | — |
| M 213/40 : | | | | | | | |
| Tons cane per arpent | ... **+13·9**±10·5 | **+7·0**±5·6 | **+4·7**±1·9 | **+4·6**±4·6 | **+10·7**±5·2 | **+17·4**±7·5 | **+10·1**±2·8 |
| C.C.S. per cent. cane | ... − 0·4 | −0·5 | −0·5 | −1·7 | +0·7 | +0·2 | −0·4 |
| Tons C.C.S. per arpent | ... **+1·43**± 1·22 | **+0·81**±0·76 | **+0·44**±0·23 | −0·12±0·59 | **+1·78**±0·64 | **+2·13**±0·86 | **+1·36**±0·40 |
| M 233/40 : | | | | | | | |
| Tons cane per arpent | ...**+14·1**±10·5 | **+5·6**±5·6 | +1·1±1·9 | **+7·2**±4·6 | **+13·1**±5·2 | **+14·9**±7·5 | **+11·4**±2·8 |
| C.C.S. per cent. cane | ... − 2·9 | −0·9 | −2·2 | −1·1 | −4·4 | −1·9 | −0·6 |
| Tons C.C.S. per arpent | ... +0·12± 1·22 | +0·47±0·76 | −0·50±0·23 | +0·45±0·59 | −0·47±0·64 | +0·75±0·86 | **+1·46**±0·40 |
| M 423/41 : | | | | | | | |
| Tons cane per arpent | ... — | +3·8±5·6 | — | **+8·7**±4·6 | -- | — | **+4·3**±2·8 |
| C.C.S. per cent. cane | ... — | −0·8 | — | +0·8 | — | — | −0·7 |
| Tons C.C.S. per arpent | ... — | +0·26±0·76 | — | **+1·53**±0·59 | — | — | **+0·42**±0·40 |

* Yields as compared with the standard (M 134/32).

† Significant difference.

Figures in bold type = significantly superior to standard.

It will be seen from the above figures that in every case, M.213/40 has given significantly better yields of cane than the standard and that in six cases out of seven its yield in commercial sugar per arpent has also been significantly higher. However, it must be pointed out that the absolute yield was rather high in all these trials, with the result that the standard—M.134/32—which has a tendency to lodge, had suffered more than the other varieties from rat attacks.

Eight trials have been laid down on estates during the period under review and include five varieties which are being tested for the first time in field trials.

### Incidence of pests and diseases

As already mentioned in this report, the cut worm, *Crambus Malacellus (Dup)* and the pink borer, *Cesamia Vuteria (Stoll)* attacked severely the young seedling plantations at Plaines Wilhems Experiment Station. The attack of the cut worm also extended to the usual interline maize plantations for borer control so that the damage caused to the canes by the latter pest remained acute.

There was no severe attack of red rot noticeable on M.134/32 during the year.

### Export of Canes

During the period under review, cuttings of M.171/30, M.134/32, M.112/34, M.165/38, M.63/39 and M.76/39 have been exported to Egypt, Australia, Tanganyika at the request of the agricultural authorities concerned.

### Imported Varieties

*(a) West Indian varieties.*—These varieties are now in field trials at Réduit, Pamplemousses and Plaines Wilhems Experiment Stations. In addition propagation plots of all these varieties have been laid down at the three stations. It is proposed also to test these varieties on Estates early in 1948.

The variety B.3439 does not seem, up to now, to be as vigorous as the other five varieties. The variety B.4098 shows a marked tendency to produce distorted nodes and seems to be very susceptible to red rot so that it is not likely to be of commercial value in Mauritius.

On the fifteenth of December a parcel of canes was received from Canal Point which contained the three varieties C.P.34/120, C.P.36/13, C.P.36/105. Later, another consignment was received from Australia containing the varieties 32/8560 and Q.28, and at the time of writing, all the varieties mentioned above were making satisfactory growth in the quarantine greenhouse.

G. Mazery,
*Ag. Geneticist.*

## PART II—CHEMICAL DIVISION

As stated in the General section of this report, the Chemical Division has been without staff for practically the whole year under review.

The main programme of work of this Division has for some years been concerned with the development of the Foliar diagnosis technique of determining the nutrient status of Sugarcane, the basic data being obtained from a comprehensive series of $3 \times 3 \times 3$ Factorial experiments testing the effect of three levels of Nitrogen, Potash and Phosphate in all combinations in the different soil types and climatic regions of the Island.

This work is of great practical value and its continuation without interruption was considered a major objective. The limited staff of the Station was therefore mobilized to carry out the reaping programme for these trials and to ensure that subsequent cultural operations and fertilizer applications were accomplished according to schedule. Leaf samples have also been taken at the appropriate stage in the growth of the plants and have been dried and stored for subsequent analysis.

In addition to these factorial experiments, older long term experiments organized by this Division were harvested.

*Results of Trial 69 Réduit.*—Comparing high and low fertilization of the varieties M.112/34 and M.134/32.

The low level of fertilization consists of 25 kilos each of Sulphate of Ammonia, nitrate of potash and phosphatic guano: the high level consists of 100 kilos of each of these fertilizers. The fertilizers are applied in one application as soon as possible after the harvesting of the previous crop.

The yields obtained to date in this trial are summarized below—

| | | *M 134/32 Tons per arpent* | *M 112/34 Tons per arpent* | *M 112/34 compared with M 134/32 Tons per arpent* | *High fertilization compared to low fertilization Tons per arpent* | |
|---|---|---|---|---|---|---|
| | | | | | *M 134/32* | *M 112/34* |
| Virgins 1943 | High | 34·3 | 33·5 | −0·8 | +10·4 | +10·4 |
| | Low | 23·9 | 23·1 | −0·8 | | |
| 1st ratoons 1944 | High | 22·9 | 22·9 | Nil | + 8·7 | + 6·5 |
| | Low | 14·2 | 16·4 | +2·2 | | |
| 2nd ratoons 1945 | High | 23·8 | 23·6 | −0·2 | + 9·8 | + 7·3 |
| | Low | 14.0 | 16·3 | +2·3 | | |
| 3rd ratoons 1946 | High | 34·0 | 31·0 | −3·0 | +19·8 | +13·4 |
| | Low | 14·2 | 17·6 | +3·4 | | |
| 4th ratoons 1947 | High | 37·1(805) | 33·4(630) | −3·7 | +23·9 | +18·2 |
| | Low | 13·2(500) | 15·2(425) | +2·0 | | |

(Figures in brackets are the weights of 30 leaves of third rank sampled on 26.2.27).

This trial shows some features of considerable interest. Whereas the variety M.112/34 has consistently outyielded M.134/32 in the low fertilized plots, it has been consistently inferior to the latter variety in the high fertilized plots. In other words the response of the variety M.134/32 to fertilizer application is considerably higher than that of the variety M.112/34.

This fact is of interest in relation to the widely held belief that an essential criterion of a good variety is its ability to respond to fertilizer applications.

*Results of Trial Bio. 5.*—To compare the effect of complete fertilization and withholding potash and phosphate.

The complete fertilizer plots have been given 150 kilos sulphate of ammonia, 100 kilos guano phosphate and 80 kilos sulphate of potash. The −P and −K plots have received the same quantity of the fertilizers other than those withheld.

The yield data in tons per arpent are summarized below—

| | *Complete* | *Minus potash* | *Minus Phosphate* |
|---|---|---|---|
| Virgins 1944 ... ... ... | 26·3 | 19·5 | 16·2 |
| 1st ratoons 1945 ... ... ... | 27·2 | 19·1 | 20·9 |
| Second ratoons 1946 ... ... | 36·4 | 29·6 | 30·0 |
| Third ratoons 1947 ... ... | 39·6 (680)* | 25·7 (541)* | 29·5 (552)* |

It is evident that considerable deficiencies of potash and phosphate are increasing with successive cropping in this trial, the potash deficiency being somewhat greater than that of phosphate. An interesting feature of the results of this trial as well as that of Trial 69 is the manner in which ratoon yields are being maintained by correct fertilization. As the yields in the island as a whole decreases appreciably with increasing age of ratoons, it is possible that a better maintenance of ratoon yields would result from higher fertilization of the ratoons. This is also well shown in the results of the St. André (Solitude S.E.) optimum nitrogen trial of which the results are given below—

ST. ANDRE (SOLITUDE S.E.) OPTIMUM NITROGEN TRIAL

Yields in tons per acre

| *Kilos sulphate of ammonia per arpent* | *Virgins 1941* | *1st ratoons 1942* | *2nd ratoons 1943* | *3rd ratoons 1944* | *4th ratoons 1945* | *5th ratoons 1946* | *6th ratoons 1947* | *Mean 1941–47* | *Mean extraction 1941–47* | *Tons sugar* |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 ... | 40·9 | 23·3 | 23·8 | 22·0 | 18·0 | 21·4 | 15·2 | 23·5 | 12·06 | 2·83 |
| 75 ... | 44·3 | 32·8 | 31·3 | 24·8 | 21·8 | 25·0 | 20·9 | 28·7 | 11·95 | 3·43 |
| 150 ... | 45·8 | 34·8 | 32·9 | 27·5 | 23·6 | 30·9 | 29·1 | 32·1 | 11·61 | 3·73 |
| 225 ... | 47·9 | 36·3 | 36·3 | 32·3 | 27·4 | 35·4 | 31·3 | 35·3 | 11·35 | 4·01 |

* Weight in grams of sample of 30 leaves of third rank taken on 26.2.47.

A good response to Nitrogen has been obtained even to the highest dosage used, and the yields of six ratoon crops have been very well maintained whereas with low nitrogen fertilization the yields of the ratoons have fallen off considerably. There is a decrease in extraction with increased dosage of Nitrogen, but the increased tonnage has more than made up for this and the response of 0·28 ton of sugar to the last increment of 75 kilos sulphate of ammonia is profitable.

Leaf injection experiments were carried out on many of these trials in which there was a marked deficiency of nitrogen, potash and phosphate at Réduit. Well marked responses to potash injection through the leaf tip were obtained in the potash deficient plots. As these were showing marked potash deficiency symptoms, a response to leaf injection was to be expected. In the low fertilization plots of Trial 69, however, response to leaf injection was much less marked although potash was undoubtedly limiting growth. In the phosphate deficient plots, phosphate deficiency was accompanied by considerable development of anthocyanin pigment—leaf injection with phosphate resulted in a decrease and frequently in a disappearance of the pigment from the injected portion of the leaf but this was the only effect of the injection. Responses to Nitrogen by the same technique were still less marked. In general, it was only when the deficiencies of these major elements were sufficiently marked as to be diagnosed by visual symptoms that marked responses to the injection technique were obtained.

## Factorial Fertilizer Trials

The dosages of fertilizers given in the plant cane crop were—

| | *0* | *1* | *2* | | *0* | *1* | *2* |
|---|---|---|---|---|---|---|---|
| N | ... 0 | 34 | 68 | N | 0 | 30 | 60 |
| $P_2O_5$ | ... 0 | 30 | 60 and the amounts in ratoons | $P_2O_5$ | 0 | 25 | 50 |
| $K_2O$ | ... 0 | 35 | 70 | $K_2O$ | 0 | 30 | 60 |

In all the trials the leaves of the different treatments were sampled during the season of maximum growth by the method adopted by the Station and at harvest composite samples of cane were taken for sucrose, juice purity, etc.

The main responses to the increasing dosages of nitrogen, phosphoric acid and potash have been given for the virgin crop in the 1946 Annual Report of this Station (page 15) but analysis of the secondary effects and interactions had not then been completed.

The linear response (i.e., the difference between the zero doses and the highest doses), the curvature (i.e., difference between the medium and high dosage minus the difference between the medium dosage and zero), and the interaction between each pair of major nutrients, for the virgin crop are given in the following table—

## 1946 Results

| *Category and Locality of trial Virgins* | *Linear response* | | | | *Curvature* | | | | *Interaction* | | | | *Standard error % of General mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *N* | *P* | *K* | *Sig. Diff* | *N* | *P* | *K* | *Sig. Diff.* | *NP* | *NK* | *PK* | *Sig. Diff.* | |
| Britannia ... | + 1·5 | +3·8 | −2·7 | ±5·1 | − 0·1 | + 2·4 | −2·6 | ±8·8 | −2·4 | −1·6 | +2·0 | ±6·2 | 10·0 |
| Benrès ... ... | + 0·9 | −3·0 | −1·5 | ±4·2 | − 3·5 | − 5·1 | −2·3 | ±7·3 | −6·2* | −1·7 | 0·0 | ±5·1 | 9·4 |
| Savinia ... ... | + 3·0 | −0·5 | +1·5 | ±3·8 | − 4·9 | − 1·4 | −2·1 | ±6·6 | +6·1* | +3·1 | +3·7 | ±4·6 | 9·2 |
| Riche en Eau ... | + 9·6* | −1·6 | +4·2* | ±2·7 | − 6·9* | − 0·3 | +1·5 | ±4·7 | +0·6 | −6·1* | −2·2 | ±3·3 | 9·3 |
| Beau Vallon ... | + 8·2* | −3·5* | +3·5* | ±3·5 | + 0·2 | − 2·6 | −3·9 | ±6·1 | +3·5 | −0·3 | +2·3 | ±4·3 | 8·8 |
| Constance ... | + 2·4 | −1·2 | +2·5 | ±4·7 | − 3·6 | + 9·0* | +5·7 | ±8·1 | −5·6 | −4·3 | 0·0 | ±5·7 | 12·6 |
| Union Flacq ... | + 3·3 | +2·1 | +2·3 | ±4·9 | − 4·7 | + 0·1 | +1·9 | ±8·5 | +1·6 | −4·2 | +4·6 | ±6.0 | 12·2 |
| Savannah... ... | + 4·4* | −0·1 | −1·4 | ±3·4 | −10·9* | + 1·2 | −2·9 | ±5·9 | +2·3 | −0·5 | −1·3 | ±4·1 | 9·6 |
| Mont Choisy ... | + 0·1 | −0·8 | +0·6 | ±2·4 | − 1·5 | − 3.6 | +2·3 | ±4·2 | −0·2 | −2·8 | 0·0 | ±2·9 | 7·1 |
| Pierrefonds ... | + 4·6* | −3·2* | +0·2 | ±2·6 | − 2·0 | + 1·2 | +1·5 | ±4·5 | −0·1 | −2·0 | −1·4 | ±3·2 | 10·1 |
| Rose Belle ... | + 0·5 | +4·2 | 0·0 | ±4·6 | + 0·5 | + 1·8 | −3·6 | ±8·0 | −0·1 | +4·6 | +3·4 | ±5·6 | 18·7 |
| Deep River ... | + 8·3* | −1·0 | −1·1 | ±3·7 | − 0·2 | − 4·4 | −1·8 | ±6·4 | +2·0 | −2·6 | −3·2 | ±4·5 | 15·2 |
| Henrietta ... | + 1·5 | −1·1 | +2·5 | ±3·0 | − 3·6 | − 2·9 | −0·1 | ±5·2 | −2·0 | +0·6 | +0·5 | ±3·7 | 24·9 |
| Beau Champ ... | + 9·1* | +0·8 | +4·0 | ±4·1 | − 2·5 | + 4·9 | +2·6 | ±7·1 | −3·1 | −6·4* | −0·5 | ±5·0 | 13·3 |
| Alma ... ... | + 2·0 | +1·4 | +2·8 | ±3·2 | − 4·3 | + 0·9 | +1·7 | ±5·5 | −0·7 | +0·1 | −0·3 | ±3·9 | 21·2 |
| Mon Songe ... | + 4·0* | −3·2 | −2·1 | ±4·0 | − 1·7 | +10·0* | +2·3 | ±6·9 | +6·7* | +3·7 | +0·1 | ±4·9 | 11·1 |
| General Mean ... | + 4·0 | −0·5 | +0·9 | | − 3·1 | + 0·7 | 0·0 | | +0·1 | −1·3 | +0·7 | | 12·7 |
| 1st ratoons : | | | | | | | | | | | | | |
| Solitude ... | + 5·5* | −1·2 | +3·4* | ±2·9 | + 2·3 | + 6·6* | +0·4 | ±5·0 | +0·1 | −1·6 | −5·0* | ±3·5 | 7·9 |
| Bon Espoir ... | +11·2* | −0·2 | +1·4 | ±4·2 | − 6·2 | + 1·7 | +1·7 | ±7·3 | +0·1 | −0·8 | +2·0 | ±5·1 | 13·7 |

* Significant differences.

The main response to Nitrogen is always positive, but the responses to the double dose of phosphate is frequently negative and in two of the trials reaches significance. The occurrence of thirteen negative responses from eighteen trials, two of which are significant, indicates that there may be a real depressing effect of the double dose of phosphate.

In the case of Pierrefonds this could be explained on the basis of unbalanced nutrition since the phosphate content of the leaves (0·59 per cent. $P_2O_5$ in the dry leaf punch samples) was too high (optimum 0·50 per cent.) but at Beau Vallon this was not the case (0·49 per cent.). This suspected depressing effect of phosphate is worthy of further investigation. Responses to potash are small but those which reach significance are positive.

The curvature effects with nitrogen are all negative indicating the falling off in response as the dosage of nitrogen is increased from medium to high, but the response to phosphate is in this respect also more conflicting. In two cases (Constance and Mon Songe) the single dose has given a significantly greater depressing effect than the double dose. On the whole there is but little interaction between the major fertilizers: there was a positive and significant N.P. interaction at Savinia and Mon Songe, but a negative interaction at Bénarès. The only two significant interactions between N and K are both negative, while there is no significant P–K interaction, except in the first ratoon results for Solitude. When the results of the series of trials are considered collectively it is obvious that the interaction effects are negligible. It is probably preferable at this stage to consider the results collectively and not to attempt to extract too many inferences from the results of single trials.

The corresponding results for the 1947 harvest are given below—

| *Category and Locality of Trial* | *Linear Response* | | | | *Curvature* | | | | *Interaction* | | | | *Standard error % of mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *N* | *P* | *K* | *Sig. Diff.* | *N* | *P* | *K* | *Sig. Diff.* | *NP* | *NK* | *PK* | *Sig. Diff.* | |
| *2nd ratoons :* | | | | | | | | | | | | | |
| Solitude ... | +15·0* | +0·8 | +2·3 | ±4·4 | − 7·2 | +2·4 | +3·0 | ± 7·6 | +1·6 | +0·2 | −2·0 | ± 5·4 | 15·8 |
| Bon Espoir ... | + 8·4* | +0·7 | 0·0 | ±2·7 | − 8·9* | −0·3 | −3·2 | ± 4·7 | −0·6 | +0·1 | −3·2 | ± 3·3 | 12·7 |
| *1st ratoons :* | | | | | | | | | | | | | |
| Britannia ... | + 4·3* | +1·6 | −0·8 | ±3·9 | − 8·6* | +0·9 | +0·7 | ± 6·7 | −0·2 | +0·9 | +1·7 | ± 4·8 | 11·8 |
| Bénarès ... | + 5·1* | +1·5 | −0·2 | ±3·3 | − 9·1* | −0·7 | +1·2 | ± 5·7 | +1·0 | +2·6 | +2·2 | ± 4·0 | 8·7 |
| Savinia ... | + 4·3 | +3·3 | +0·6 | ±8·2 | − 3·4 | −0·9 | −9·8 | ± 14·2 | +5·3 | +2·6 | +6·3 | ±10 0 | 23·5 |
| Rich en Eau ... | + 5·5* | −0 6 | +1·7 | ±3·2 | − 10·8* | −2·3 | −1·4 | ± 5·5 | −3 1 | −6·1* | +2·8 | ± 3·9 | 11·4 |
| Beau Vallon ... | + 9·5* | −1·0 | +1·8 | ±4·3 | − 3·6 | 0·0 | −4·0 | ± 7·4 | +1·8 | −3·6 | −0·7 | ± 5·2 | 14·9 |
| Constance ... | + 6·2* | −1·5 | +2·3 | ±3·8 | − 5·2 | +2·3 | −6·1 | ± 6·6 | +0·5 | −2·8 | −0·7 | ± 4·6 | 12·1 |
| Union Flacq ... | + 8·1* | −1·7 | −1·2 | ±6·6 | − 11 7* | −3·6 | +0·6 | ± 11·4 | +0·1 | −7·7 | +2·6 | ± 8·1 | 18·1 |
| Savannah ... | + 8·4* | 0·0 | −0·8 | ±3·6 | − 13·8* | +5·4 | −1·8 | ± 6·3 | +1·3 | −0·1 | +1·5 | ± 4·4 | 10·7 |
| Mont Choisy ... | + 5·8* | −1·3 | +0·2 | ±2·6 | − 2·8 | −1·6 | +0·1 | ± 4 5 | +0·2 | −2 0 | +2·4 | ± 3·2 | 12·1 |
| Pierrefonds ... | +14·0* | −1·4 | +2·8 | ±2·5 | − 6·8* | −1·3 | −3·0 | ± 4·3 | +0·5 | +0·4 | +4·3* | ± 3·1 | 7·9 |
| Rose Belle ... | +10·0* | +4·9 | +2·2 | ±5·8 | − 1·3 | −2·7 | −2·9 | ± 10·0 | +1·6 | −0·6 | −1·6 | ± 6·5 | 17·4 |
| Deep River ... | + 5·2* | −1·8 | 0·0 | ±4·2 | − 2·3 | −2·9 | −2·2 | ± 7·3 | +3·4 | −4·3 | +0·6 | ± 5·1 | 13·5 |
| Henrietta ... | + 9·7* | +2·0 | +2·2 | ±3·3 | − 4·8 | −2·7 | +2·8 | ± 5·7 | −1·8 | +3 7 | +1·1 | ± 4·0 | 12·6 |
| Beau Champ ... | +11·1* | −3·2 | +2·8 | ±4·0 | − 5·2 | +0·2 | +5·6 | ± 6·9 | 0·0 | −3·5 | −5·8* | ± 4·9 | 12·0 |
| Alma ... ... | + 6·1* | +1·6 | +3·7* | ±2·4 | − 4·0 | +1·7 | +1·4 | ± 4·2 | +0·7 | +1·4 | −0·7 | ± 2·9 | 14·0 |
| GENERAL MEAN ... | + 8·1 | +0·3 | +1·1 | | − 6·4 | −0·4 | −1·1 | | +0·8 | −1·1 | +0·5 | | 13·5 |

* Significant differences.

The 1947 results demonstrate a considerably greater response to nitrogen in first ratoons as compared to that obtained in Virgins. The nitrogen response is significant in all individual experiments with the exception of one trial where the error is high.

The suspected depressing effect of phosphate has practically disappeared in the ratoons but there are no significant positive responses with the exception of Rose Belle. The response to phosphate at Rose Belle though not quite significant for virgins or 1st ratoons considered separately is fully significant for the two crops together.

A significant response to potash was obtained in 1st ratoons at Pierrefonds and Alma, and at Henrietta a significant response to potash is apparent when the results of both virgins and first ratoons are considered. Significant negative curvatures are shown for Nitrogen in most of the trials—the curvature being higher in ratoons than in virgins probably owing to their shorter growth period. The responses to phosphate and potash are too low to provide any reliable index of curvature.

No significant N.P. interactions occurred in ratoons but the significant positive N.P. interaction obtained at Savinia in Virgins is still high in ratoons though owing to the high error it failed to reach significance. The negative N.P. interaction obtained at Bénarès in virgins is not shown at all in ratoons and so little significance should be attached to the anomalous result in virgins.

With respect to the N.K. interaction the significant negative interaction obtained in virgins at Riche-en-Eau is also significant and negative in first ratoons and the negative interaction at Beau Champ is still apparent in ratoons though in ratoons it fails to reach significance.

A similar negative interaction is indicated at Deep River S.E.

Although unidentified factors may be responsible for such anomalies in single instances if these negative interactions persist, it will evidently be necessary to investigate the matter particularly with a view to determining whether some element other than N, P or K may be limiting yields.

A positive PK interaction is indicated at Savinia though in both crops it fails to reach significance: this interaction is significant at Pierrefonds in first ratoons ; on the other hand a negative P.K. interaction at Beau Champ in first ratoons was significant.

The whole series of experiments considered collectively showed no appreciable interaction between any of the three elements.

## Relationship between comparative indices of yields of millable cane and the indices of vegetative growth (weight of a sample of 30 leaves taken at the optimum growing period)

The data on yields and relative growth indices at the three levels of nitrogen, phosphate, and potash fertilization are presented in the following table—

TABULATED RESULTS OF FACTORIAL FERTILIZER TRIALS ON ESTATES, 1947

| *Name of Estate* | *No. of Trial* | *Category* | *Comparative Yield of Millable Cane* | | | | | | | | | | | | *Index of Vegetative Growth* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Nitrogen (N)* | | | | *Phosphoric Acid ($P_2O_5$)* | | | | *Potash ($K_2O$)* | | | | *Nitrogen (N)* | | | | *Phosphoric Acid ($P_2O_5$)* | | | | *Potash ($K_2O$)* | | | |
| | | | *0* | *(a)* | *1* | *2* | *0* | *(a)* | *1* | *2* | *0* | *(a)* | *1* | *2* | *0* | *(b)* | *1* | *2* | *0* | *(b)* | *1* | *2* | *0* | *(b)* | *1* | *2* |
| Solitude S.E. ... ... | T 1/44 | ... 2nd ratoons ... | 100 | (19·1) | 158 | 178 | 100 | (27·8) | 97 | 103 | 100 | (27·1) | 99 | 108 | 100 | (594) | 125 | 133 | 100 | (703) | 101 | 101 | 100 | (789) | 96 | 101 |
| Bon Espoir S.E. ... ... | T 2/44 | ... do. ... | 100 | (15·8) | 155 | 153 | 100 | (21·1) | 102 | 103 | 100 | (21·0) | 108 | 100 | 100 | (630) | 133 | 146 | 100 | (781) | 102 | 104 | 100 | (799) | 101 | 98 |
| Britannia S.E. ... ... | T 1/45 | ... 1st ratoons ... | 100 | (29·3) | 122 | 115 | 100 | (32·2) | 101 | 105 | 100 | (33·4) | 98 | 98 | 100 | (672) | 117 | 119 | 100 | (722) | 105 | 107 | 100 | (741) | 102 | 103 |
| Bénarès S.E. ... ... | T 2/45 | ... do. ... | 100 | (34·0) | 121 | 115 | 100 | (37·2) | 103 | 104 | 100 | (38·4) | 98 | 99 | 100 | (740) | 116 | 128 | 100 | (844) | 101 | 160 | 100 | (842) | 100 | 102 |
| Savinia S.E. ... ... | T 3/45 | ... do. ... | 100 | (32·1) | 112 | 113 | 100 | (33·0) | 106 | 110 | 100 | (32·9) | 116 | 102 | 100 | (757) | 115 | 118 | 100 | (808) | 106 | 106 | 100 | (835) | 100 | 102 |
| Riche en Eau S.E. ... | T 5/45 | ... do. ... | 100 | (23·4) | 135 | 123 | 100 | (27·9) | 103 | 98 | 100 | (26·8) | 107 | 106 | 100 | (671) | 125 | 128 | 100 | (797) | 98 | 99 | 100 | (766) | 104 | 107 |
| Beau Vallon S.E. ... | T 6/45 | ... do. ... | 100 | (23·4) | 128 | 140 | 100 | (29·3) | 98 | 97 | 100 | (27·2) | 111 | 107 | 100 | (701) | 120 | 132 | 100 | (828) | 100 | 98 | 100 | (791) | 107 | 105 |
| Constance S.E. ... ... | T 7/45 | ... do. ... | 100 | (27·6) | 121 | 122 | 100 | (32·7) | 94 | 95 | 100 | (29·4) | 114 | 108 | 100 | (745) | 122 | 131 | 100 | (855) | 102 | 105 | 100 | (864) | 100 | 104 |
| Union Flacq S.E. ... | T 8/45 | ... do. ... | 100 | (30·4) | 133 | 127 | 100 | (36·6) | 103 | 95 | 100 | (37·1) | 98 | 97 | 100 | (628) | 130 | 137 | 100 | (767) | 101 | 102 | 100 | (737) | 104 | 109 |
| Savannah S.E. ... ... | T 9/45 | ... do. ... | 100 | (27·0) | 141 | 131 | 100 | (34·4) | 92 | 100 | 100 | (33·6) | 101 | 98 | 100 | (646) | 121 | 128 | 100 | (752) | 101 | 99 | 100 | (789) | 94 | 95 |
| Mont Choisy S.E. ... ... | T10/45 | ... do. ... | 100 | (18·1) | 124 | 132 | 100 | (21·9) | 100 | 94 | 100 | (21·4) | 100 | 101 | 100 | (717) | 119 | 129 | 100 | (821) | 104 | 100 | 100 | (806) | 105 | 105 |
| Pierrefonds S.E. ... ... | T12)45 | ... do. ... | 100 | (24·0) | 143 | 158 | 100 | (32·6) | 100 | 96 | 100 | (30·2) | 110 | 109 | 100 | (711) | 117 | 122 | 100 | (813) | 97 | 100 | 100 | (782) | 105 | 104 |
| Rose Belle S.E, ... ... | T13/45 | ... do. ... | 100 | (25·3) | 122 | 139 | 100 | (27·6) | 114 | 118 | 100 | (28·9) | 109 | 108 | 100 | (823) | 107 | 114 | 100 | (865) | 102 | 104 | 100 | (865) | 102 | 104 |
| Deep River S.E. ... ... | T14/45 | ... do. ... | 100 | (28·3) | 113 | 118 | 100 | (31·7) | 102 | 94 | 100 | (31·0) | 103 | 100 | 100 | (698) | 116 | 118 | 100 | (784) | 101 | 98 | 100 | (762) | 105 | 105 |
| Henrietta S.E. ... ... | T15/45 | ... do. ... | 100 | (20·4) | 136 | 147 | 100 | (24·6) | 110 | 108 | 100 | (25·4) | 99 | 109 | 100 | (710) | 116 | 120 | 100 | (779) | 105 | 101 | 100 | (761) | 105 | 108 |
| Beau Champ S.E. ... | T16/45 | ... do. ... | 100 | (27·2) | 130 | 141 | 100 | (35·3) | 92 | 91 | 100 | (332) | 92 | 108 | 100 | (707) | 111 | 110 | 100 | (770) | 96 | 98 | 100 | (738) | 103 | 104 |
| Alma S.E. ... ... | T17/45 | ... do. ... | 100 | (13·2) | 139 | 146 | 100 | (16·4) | 100 | 110 | 100 | (15·3) | 108 | 124 | 100 | (677) | 113 | 113 | 100 | (722) | 101 | 105 | 100 | (701) | 107 | 108 |
| General Average (Tons per arpent) ... ... ... | | | | | 24·6 | 31·9 | 32·7 | | 29·5 | 29·8 | 29·8 | | 29·0 | 30·0 | 30·1 | | | | | | | | | | | |
| Comparative yield ... ... ... ... ... .. | | | | | 100 | 130 | 133 | | 100 | 101 | 101 | | 100 | 103 | 104 | 100 | | 119 | 125 | 100 | | 101 | 102 | 100 | | 102 | 104 |

(*a*) Actual yields in tons cane per arpent represented by 100 are given in brackets.

(*b*) Actual weight of sample of thirty leaves of third rank in grams, represented by 100 are given in brackets.

## The Vegetative Growth Index

The definition of the vegetative growth index was given in the 1945 Annual Report (p. 13) and it was shown there that there was a high correlation between the comparative vegetative growth index and the final yield of cane at harvest. For instance the yield for virgin trials at the 0, 1, 2 Nitrogen levels were 100–112–113 whereas the corresponding ratio of vegetative growth indices was 100–111–114.

While the vegetative growth index is highly correlated with final yields in the first ratoon crop, also, the relationship does not seem to be quantitative as was the case in virgins, the yield response to Nitrogen being quantitatively greater than the corresponding vegetative growth index response, e.g., the yield response to 0N, 1N, 2N was 100–130–133, the corresponding figures for the vegetative growth index being 100–119–125. This may be due to the fact that the potential capacity of leaf growth may be lower than that of stem growth and that when the response in terms of cane yields is particularly high, leaf growth fails to keep up with cane growth. This does not, however, mean that the vegetative growth index cannot be a valuable index of response to fertilizer if adequate consideration is taken of the fact that the quantitative relationship may vary with the degree of response. In fact, the effect of the increasing fertilizer doses on the index are much smoother and more in accord with the law of diminishing returns than are the corresponding yield data and anomalous results are much less frequent.

## Effect of differential fertilization on quality of the cane

Sugar analyses of composite samples of cane from each of the differentially fertilized plots were made, using the experimental cane mill at Réduit. The summarized data for all the trials are presented below—

| *Fertilizer levels* | *Nitrogen* | | | *Phosphate* | | | *Potash* | | |
|---|---|---|---|---|---|---|---|---|---|
| | *0* | *1* | *2* | *0* | *1* | *2* | *0* | *1* | *2* |
| Commercial cane sugar % cane (1946) ... ... | 10·75 | 10·29 | 10·41 | 10·79 | 10·49 | 10·82 | 10·55 | 10·72 | 10·67 |
| Commercial cane sugar % cane (1947) ... ... | 11·99 | 11·79 | 11·53 | 11·66 | 11·98 | 11·96 | 11·75 | 11·70 | 11·40 |
| Mean both years ... | 11.37 | 11·04 | 10·97 | 11·23 | 11·24 | 11 39 | 11·15 | 11·21 | 11·04 |
| Absolute juice purity (1946) ... | 78·56 | 77·00 | 78·06 | 78·38 | 77·44 | 78·65 | 78·14 | 78·26 | 78·34 |
| Absolute juice purity (1947) ... | 81·98 | 81·40 | 80·64 | 81·29 | 81·91 | 82·16 | 81·64 | 80·83 | 80·59 |
| Mean, both years ... | 80·27 | 79·20 | 79·35 | 79·84 | 79·68 | 80·41 | 79·89 | 79·55 | 79·47 |
| Fibre % cane (1947) ... ... | 10·4 | 10·1 | 9·5 | 10·2 | 10·0 | 10·5 | 10·2 | 9·7 | 10·2 |
| Tons Commercial cane sugar per arpent ... ... | 2·95 | 3·76 | 3·77 | 3·44 | 3·57 | 3·54 | 3·41 | 3·51 | 3·43 |

There seems to be little doubt that increasing the dosage of nitrogen has resulted in a decrease in commercial cane sugar per cent. cane, in the purity of the juice and in the fibre content of the cane. The actual yield of sugar per acre has increased, however, although the single dose was practically equal to the double dose.

The evidence with respect to the effect of phosphate is less clear, but indicates that phosphate has resulted in a slight increase in C.C.S. per cent. cane in a different direction in the virgin and first ratoon crop, the mean of both years showing no definite trend.

The effect of potash on the quality of the cane is small and seems to be in a different direction in the virgin and first ratoon crop, the mean of both years showing no definite trend.

### Selected plots for complete analysis

From each of these experiments one plot was selected from a consideration of average weight of leaf of the third rank showing the highest response to the lowest level of fertilizer. Thus, each element is considered individually—when a large response is indicated the highest level of the element is taken, for a medium response the medium dose was selected whereas for no response the lowest level was selected. The comparative yields of the selected plots are given in the following table—

YIELD IN TONS CANE PER ARPENT

| *Trial* | *Plot selected* | *Yield* | *000 Plots* | *222 Plots* |
|---|---|---|---|---|
| Union Flacq ... ... | 201 | 35·4 | 27·6 | 37·2 |
| Rose Belle ... ... | *201 | 32·4 | 21·7 | 43·2 |
| Savinia ... ... ... | 210 | †29·4 | 35·5 | 38·4 |
| Britannia ... ... ... | 110 | 37·4 | 30·5 | 38·0 |
| Pierrefonds ... ... | 201 | 39·8 | 24·8 | 42·2 |
| Beau Champ ... ... | 200 | 41·0 | 27·9 | 32·2 |
| Mont Choisy ... ... | 211 | 26·8 | 17·9 | 24·5 |
| Bon Espoir ... ... | 210 | 24·1 | 14·0 | 17·9 |
| Beau Vallon ... ... | 201 | 36·6 | 22·1 | 29·5 |
| Bénarès ... ... | 200 | 38·3 | 32·9 | 45·4 |
| Solitude ... ... ... | 200 | 33·1 | 15·7 | 38·2 |
| Riche en Eau ... ... | 102 | 32·2 | 20·9 | 23·6 |
| Réunion ... ... ... | 212 | 39·1 | 16·4 | 31·2 |
| Savannah ... ... ... | 200 | 32·2 | 30·7 | 35·2 |
| Alma ... ... ... | 122 | 23·6 | 12·1 | 24·1 |
| Deep River ... ... | 211 | 30·0 | 28·4 | 30·6 |
| GENERAL MEANS ... ... | | 33·2 | 23·7 | 33·2 |

From these data it may be calculated that the optimum fertilization was 54·3 Kgrms. Nitrogen, 12·5 Kgrms. $P_2O_5$ and 22·5 Kgrms. $K_2O$. Corresponding data for the virgin crop were 44 kilos Nitrogen, 18 kilos $P_2O_5$ and 21 kilos $K_2O$.

NOTE—* Plot 211 would have been a better choice.
† Unaccountably low yield of selected plot partly due to rat damage.

A somewhat higher requirement of Nitrogen fertilizers and a possibly slightly lower phosphate requirement in the ratoons as compared to virgins is indicated. Samples of complete cane plants from the selected plots have been prepared for analysis but it has not yet been possible to carry out the analytical work.

## Demonstration plots on fertilizer requirements on small Planters' Lands

Seven such demonstration plots on the necessity of applying Phosphatic Guano were harvested during the year. In some of these, the small Planters themselves gave relatively high dressings of farmyard manure. Nevertheless considerable responses to phosphate were frequently obtained. At Cluny where many small planters have not been applying phosphate, application of phosphate fertilizer increased the yield from 9·3 tons per arpent to 20·6 tons. Responses of 1 to 4 tons per acre were obtained in some of the other demonstration plots.

Leaf samples for Foliar diagnosis are now taken from Small Planters' fields and the analysis of these will form a valuable guide in laying down fertilizer demonstration plots to correct the major deficiencies.

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# PART III—BOTANICAL DIVISION

## Research Botany

*Weed Control Investigations.*—In the Annual Report for 1946 a survey of the weed situation in the Island was presented and the results of preliminary experiments on the control of the most noxious weed species were given.

It had not been possible at that time to investigate fully the effect of chemical herbicides on all the species concerned and the number of experiments carried out on some species was inadequate to determine their reactions under various environmental and climatic conditions.

During the year under review further work was carried out on the weed species which had already been subject to preliminary investigation and extensive experiments were carried out on species not hitherto investigated.

Further ecological work particularly on viability of seeds and on methods of propagation was carried out, and attempts were made to fortify herbicides at present available with a view to increasing the number of species affected.

It is proposed to follow the plan adopted in the 1946 Annual Report, describing the work carried out on the species belonging to various plant families.

### Gramineæ

*Cynodon dactylon (Chiendent).*—Extensive experiments with most of the herbicides commercially available showed that the only substances of any value against this weed were Sodium chlorate, Ammonium sulphamate and acidified Sodium arsenite. Of these, sodium chlorate was considerably superior to the other herbicides. The success achieved with sodium chlorate depends to a considerable degree on the locality where the grass is located and on the stage of growth of the grass when treated.

In the Flacq district of Mauritius, chiendent is not deeply rooted—very few rhizomes are found below 9 inches depth. Under these conditions complete control of chiendent is obtained with one application of 10 per cent. sodium chlorate if the herbicide is applied under dry conditions and with double the usual addition of wetting agent. In the Savanne, lower Plaines Wilhems and Black River districts, the rhizomes of this grass may penetrate to 4–5 feet and one application of 10 per cent. sodium chlorate gives very poor control. Under these conditions a considerable reduction in the population of the weed is obtained by first burning the existing growth. Under suitable conditions a complete burn of the aerial parts is obtained. The new growth which emerges is sprayed then with either 10 per cent. sodium chlorate or ammonium sulphamate at 2–3 lbs. to the gallon. This application kills back the young shoots and new growth following the application is sparse and delayed. An alternative method is to dig out the chiendent in the first few inches of soil by an ordinary cleaning operation with hoes, either without or preferably with the preliminary burning operation, and to destroy new growth with sodium chlorate or ammonium sulphamate as described above.

Providing that these chemicals are not sprayed at rates higher than 100 gallons per acre, the field can be almost immediately planted in cane, particularly if a dressing of farmyard manure and a small quantity of nitrate fertilizer is applied at planting. Under these conditions there is practically no toxic effect on the young cane plants and the infestation of chiendent is reduced to such an extent that the growing cane easily controls the weed. In fact, providing that means are taken to prevent early competition of the weed with the cane, the growing of two or three good crops of cane is the cheapest and most effective method of controlling this weed.

An excellent example of this is to be seen at the Government Tobacco Station at Richelieu where extremely heavy infestations of Chiendent are being effectively controlled by growing good cane crops. For this purpose cane varieties of vigorous growth giving early cover over the interlines are extremely effective .

The chemical methods of control described above are particularly applicable to dry stony soils: where infestation occurs in the free soils of the wet districts mechanical means of control are particularly effective in reducing the infestation prior to cane planting. For this purpose, a very effective implement at present in use in Mauritius is a type of V-blade weeder designed by Mr. Charles de Spéville of Mon Désert S.E. This implement is drawn by a tractor and cuts all weeds at a depth of approximately six inches the soil passing over the blade on a similar principle to those implements figured in Robbins Crafts and Raynor's book on weed control, page 104. The weeds thus loosened are easily removed from the field by hand and are either composted or burnt at the side of the field.

*Phalaris arundinacea* (Mackaye or Herbe Feu).—Extensive experiments on the control of this weed has confirmed the previous recommendation that sodium chlorate at 10 per cent. concentration is the most effective method of controlling this weed. Ammonium sulphamate, acidified sodium arsenite, various toxic oils, and a compounded herbicide described later in this report were less effective. In most cases 70–80 per cent. of the rhizomes are destroyed by one application of sodium chlorate, but a further application may be necessary for complete control. An economy in the use of herbicide is obtained by using the V-blade weeder, or alternatively by disc ploughing and removing the weeds thus loosened by hand. Regrowth following this operation is then destroyed with sodium chlorate. Small areas in standing cane may be effectively suppressed with a cheap compounded herbicide developed in this Station during the year. Sodium chlorate is very effective in killing the weed on tramway tracks and cane field roads and to prevent encroachment of the weed into the fields. Ammonium sulphamate, although giving a good kill of the aerial parts does not penetrate into the rhizomes in the same manner as sodium chlorate and is thus very inferior to this substance in the control of Mackaye.

*Echinocloa colona* (Herbe Sifflette).—Considerable success has followed the use of sodium chlorate on this weed in the Flacq district. Concentrations of chlorate up to 40 per cent. were tried as well as various concentrations of Ammonium sulphamate up to 4 lbs. per gallon. Sodium chlorate at 10 per cent. was almost as effective as a 40 per cent. concentration and decidely

superior to ammonium sulphamate. Two applications of 10 per cent. chlorate reduced the weed by 80–90 per cent. and under these conditions the cane successfully competes with the weed and the infestation is reduced still further.

*Herbe Riz (at present unidentified).*—This graminaceous weed occurs in localized areas in the wetter parts of Mon Désert S.E. It was successfully controlled by sodium chlorate only when the soil was dry—along river banks and in badly drained areas regrowth occured. This was in marked contrast with areas of the weed growing on slopes with good drainage, where control of the weed with sodium chlorate was complete after one application at 10 per cent. concentration with a suitable wetter.

*Saccharum spontaneum.*—During the year the writer's advice was sought on the control of a tall grass weed which was encroaching rapidly on the cane fields at Réunion S.E., and its annex Henrietta S.E. This weed was at the time unidentified but later flowers were obtained and the weed was identified as a new form of *Saccharum spontaneum* which was not previously known to exist in Mauritius. This identification was confirmed by Dr. R. E. Vaughan, Director of the Mauritius Institute and Museum. The weed was almost impossible to remove by digging, rhizomes penetrating to a depth of 5 to 6 feet: and the operation of removal, costing about Rs. 800 per acre, was prohibitive.

Fortunately the weed was very susceptible to sodium chlorate and almost all the areas infested with this weed have now been economically cleared with sodium chlorate. Here again the most effective dosage was 10 per cent. chlorate. Only a few weak chlorotic shoots appeared several weeks after a single application of 10 per cent. chlorate and spot spraying of these completed the eradication. In conformity with this result it was noted that penetration of the chlorate along the rhizome was extraordinarily deep, the rhizomes becoming discoloured and rotted. Buds sprouting from unaffected parts of the rhizomes were too deep for survival and most perished before reaching the soil surface

The flowers produced during the current year did not bear fertile seeds and this wild sugarcane had spread purely by vegetative means. It is supposed to have been introduced for the purpose of supplying bedding for horses several decades ago.

*Imperata cylindrica* (Lalang grass).—The Department of Agriculture has been engaged for some time in a campaign for the eradication of this noxious weed, which apparently escaped from the Royal Botanic Gardens and is found in restricted localities particularly in the north of the island. Experiments were carried out at various times of the year for the control of this weed using sodium chlorate and ammonium sulphamate. The resuts, however, indicated that control of this weed by chemical means is not economic at present prices. Repeated applications of large dosages of sodium chlorate and ammonium sulphamate failed to eradicate the weed. At present grubbing out or destruction by flame throwers at frequent intervals offers the most economic method of eradication.

*Ischoemum aristatum* (Herbe d'Argent).—Since this weed is found in the wetter free soils the V-blade weeder is the most effective method of control. The only effective chemical for control—sodium chlorate is at present in short supply and should be used for more noxious weeds which are difficult to control by cultivation methods.

*Annual graminaceous weeds.*—Practically all the annual graminaceous weeds are effectively controlled by sodium chlorate, ammonium sulphamate, arsenic and mineral oils. The chief consideration is the cost of eradication. Excellent results against herbe Bambou *(Setaria barbata), Chloris pycnothrix,* etc., have been obtained with Diesel oil and with Stoddard solvent as well as with sodium chlorate at 5–10 per cent. and ammonium sulphamate at 2–3 lbs. per gallon.

*General work on Compounded herbicides for graminaceous and other weeds.*—Investigators in Hawaii have claimed that the herbicidal action of sodium chlorate can be increased considerably by the addition of activators which are claimed to exercise a synergetic effect on the chlorate. For this purpose sodium pentachlorphenate has been extensively used in Hawaii and its use as an activator has been patented as the Hawaiian Sugar Planters Association (H.S.P.A.) activator.

During the year a quantity of sodium pentachlorphenate became available and its supposed activating effect was tested against a large number of graminaceous weeds and against other noxious weeds such as Artemesia vulgaris, etc. Sodium chlorate was used at concentrations from 2 per cent. to 15 per cent. with and without the addition of sodium pentachlorphenate (hereafter referred to as S.P.C.P.) at 0·4 per cent. to 1·0 per cent. In some experiments the hormone weed killer Methoxone was also included at 0·15 per cent. to 0·3 per cent. The effects of equivalent concentrations of S.P.C.P. alone were tested at the same time. In the first place it must be emphasized that S.P.C.P. is itself an effective, though somewhat expensive herbicide. At 1 per cent. concentration it has an excellent scorching effect on most weed species. The results of treatment with sodium chlorate with and without the addition of S.P.C.P. were not different providing that the sodium chlorate concentration was not less than 10 per cent. At concentrations of 2–5 per cent. the effect of the mixture of sodium chlorate and S.P.C.P. was better than the chlorate alone, but not markedly better than the two herbicides applied separately. Moreover, the effect of 2 per cent. chlorate plus 0·5 per cent. S.P.C.P. was not superior to 5 per cent. chlorate alone although the cost was about equivalent. The writer, therefore, came to the conclusion that little was to be gained from the addition of S.P.C.P. at Rs. 2 or more per lb. to the sodium chlorate. Lately the writer has received a copy of a paper on the activation of herbicides by Crafts and Reiber (1945). Experiments carried out by these authors failed to provide any definite evidence of activation by S.P.C.P. On the other hand the herbicidal action of S.P.C.P. may itself be increased by any acid salt providing that an insoluble compound is not produced. Actually Hance in Hawaii has used S.P.C.P. as

an activator for mixtures of sodium chlorate and sodium arsenite. More recently, complicated mixtures are used in Hawaii as general purpose weed killers. According to information privately communicated to the writer, some of the mixtures used on Hawaiian estates have the following constitution—

A.
- 80 lbs. S.P.C.P.
- 40 gallons water.
- 10 gallons 27R solution (27R is a spreader manufactured by the Standard Oil Co. and emulsified at 2 lbs. per gall.).

B.
- 5 gallons Dimethylcarbonol or petrohol stabilizer.
- 80 lbs. sodium chlorate.
- 19 gallons water.
- 20 gallons Pennite 6 (an arsenical solution).

A and B solutions are mixed and brought up to 100 gallons with water. The mixture is diluted from 20 to 50 times for use according to the degree of resistance of the weeds and the climatic conditions.

Other solutions used are—

A. Diesel Oil 1 vol
Water 1 vol ... Emulsified.

B. 1 Vol 27R solution (20 lbs. of spreader 27R in 100 gallons water).
Mix A and B and use at dilution X20.

For wet localities the following mixture is used—

120 gallons Pennite 6 (arsenical solution).
480 lbs. S.P.C.P.
35 lbs. 27R.
480 lbs. sodium chlorate.

A fish oil known as ' Hafoil ' is frequently used as a stabilizer. The principle in using these solutions as universal herbicides is that the weeds are attacked at a very early stage in their development, when they are killed at very dilute solutions of the herbicides used.

These solutions were made up in Mauritius and tried out on an extensive scale. It was found that at a concentration of X20 to X40 the solutions caused considerable scorching of the cane plants. Although such scorching is of little significance when the crop is 24-month crop as in Hawaii it assumes importance in Mauritius where the crop is harvested after 12–14 months.

In the writer's opinion the effectiveness of these Hawaiian compounded herbicides is not so much due to the activation of some components by other constituents of the mixture, but to the fact that different weed species show different degrees of susceptibility to toxic chemicals. Such differential susceptibility has already been described in the Annual Report of this Station for 1946—in particular the varying reactions of Herbe Condé *(Cordia macrostachya)* and Herbe Tourterelle *(Wikstrœmia viridifolia)* to sodium chlorate and to copper chloride. Further examples of the same principle is seen in the extreme effects produced by even low concentrations of ammonium sulphamate on Herbe Condé. At concentrations below 1 per cent. complete

defoliation of Herbe Condé occurs, whereas this concentration has no harmful effects on *Cyperus rotundus* (Herbe à Oignon). By finding to which particular chemical a weed species is most susceptible, it is possible to compound a mixture which has very good herbicidal properties even at very low concentrations. Using the Hawaiian solutions as standard the writer prepared several such solutions, some are incompatible chemically—precipitates being formed but after some experimentation a very useful general purpose herbicide was prepared.

This mixture has the following composition—

A. { 80 grams ammonium Dinitroorthocresol } in 400 cc. water.
{ 80 grams Ammonium sulphamate. }
{ 200 grams of a 1:1 emulsion of Stoddard solvent or Diesel oil in 1 per cent. soap solution.
{ 50 grams Teepol wetter.
{ 80 grams. sodium chlorate in 200 cc. of water.
{ 200 grams 6 per cent. solution of sodium arsenite.

This mixture forms a very stable mixture which keeps indefinitely and only requires slight agitation immediately before using. It is miscible with water in all proportions and is used ot a dilution of X20 to X60. Its general herbicidal properties at least equal the best Hawaiian solution tested here and on decomposing in the soil a certain amount of nitrogenous fertilizer from the ammonium DNOC and the ammonium sulphamate becomes available. The cost is approximately the same as the first of the Hawaiian solutions mentioned above.

At concentrations of X20, most weeds are killed or seriously damaged by this herbicide, but it can be used in growing cane without much harmful effect on the cane at concentrations of X30 to X60 unless the latter is deliberately sprayed.

One of its great advantages is that the hormone herbicides such as Methoxone or 2–4 Dichlorophenoxyacetic acid derivatives can be freely mixed with the diluted herbicide without reducing the activity of the latter substances to any great extent, thus ensuring a considerably wider range of activity than can be obtained with any simple herbicide.

The compounded herbicide described above is very efficacious against young grass seedlings—which are not affected by the hormone weed killers and more mature grass weeds are scorched to soil level and suppressed to such an extent that they cannot colonize areas of susceptible weeds killed by methoxone or 2–4 D.

Further information on the use of this compounded herbicide is given later in this report.

*Cyperaceæ*.—A considerable amount of further work has been carried out particularly on *Cyperus rotundus* (Herbe à Oignon). Among the products used were Methoxone (Agroxone) as liquid and dust, Niagara (a form of 2–4 D) (D.C.P.A.) manufactured by Niagara Sprayer and Chemical Division U.S.A. ; Dow 2–4 D (manufactured by the Dow Chemical Co., U.S.A.) ; Barweed a form of sodium 2–4 D (manufactured by the American Cyanamide Co.,

U.S.A.) and Ammonium 2–4 D prepared from pure British Dichlorophenoxyacetic acid by the addition of the required quantity of liquid ammonia. The sample of Agroxone dust had been received over 18 months and the results obtained with it were considerably inferior to the results obtained in 1946 with the same material. This decreased activity was apparent in experiments carried out on other weed species. There seems to be a strong possibility that storage under the humid conditions existing in Mauritius has markedly decreased the activity of this substance. The liquid herbicides were used at active concentrations of 0·1, 0·2 and 0·3 per cent. At all these concentrations the Dow 2–4 D and the ammonium 2–4 D were equal in activity but were considerably better than the Niagara and Barweed 2–4 D products and somewhat more effective than Methoxone. In all cases although the existing aerial shoots were killed, a luxuriant new growth developed within three to four weeks of the original application even after treatment with 0·3 per cent. concentration of the active substances.

The results obtained in the dry parts of Flacq were considerably better than those obtained in the medium rainfall districts and there was considerably less regrowth.

Private information supplied to the writer by Dr. H. H. Dodds of the South African Sugar Expedient Station indicated that *Cyperus rotundus* was completely controlled in Natal with Agroxone dust at 3 cwt. per acre. The same substance at 300 kilos per acre has failed to give complete control under Mauritius conditions.

The suggestion made in the 1946 Annual Report of this Division, viz., that it might be found profitable to spray or treat the cane furrows only, has, on testing, been found to give very encouraging results. In making the furrows a considerable number of tubers are lifted from the furrows and buried in the banks. The density of nut grass growth in the furrows or holes is accordingly considerably less than in the banks. Spraying the furrows does in fact give good practical control of the weed. This enables the first cleaning operation by implements to be considerably delayed in that by keeping the furrows clean competition with the young cane plants is greatly reduced. Experiments are now in progress with a dust form of 2–4 D (DCPA) supplied by Messrs. Imperial Chemical Industries Ltd., and with Esterone 44 (isopropyl ester of 2–4 D manufactured by the Dow Chemical Co. U.S.A.), and Barweed 40 (triethanolamine ester of 2–4 D) and Barweed 44 (isopropyl ester of 2–4 D, manufactured by the American Cyanamide Co.). The results of these trials are not yet available.

*Effect of Nut grass (Cyperus rotundus) and other Annual weeds on the growth of Sugarcane.*—An experiment was carried out in the Flacq district on the effect of weed control on the development of sugarcane. Three treatments were included in the trial and the treatments were replicated in randomized blocks. The treatments consisted of—

(1) Unweeded ;

(2) Weeded by hoe according to the usual estate practice ;

(3) Weeded with hormone weed killer (ammonium dichlorophenoxy acetic acid).

At the commencement of the experiment, *Cyperus rotundus* (Herbe a Oignon) was the dominant weed but later *Cardiospermum helicacabum* (Liane Poc Poc) and *Argemone Mexicana* (Chardon) were plentiful ; other weeds present in small numbers were *Commelyna spp.* (Herbe Cochon), *Apium leptophyllum* (Anis sauvage), *Accacia sp.*, *Convolvulus sp.*, (Liseron), *Portulaca oleracea* (Pourpier), *Passiflora suberosa* (false liane Poc Poc), *Parthenium hysterophorus* (Herbe blanche) etc.

Unfortunately while the experiment was in progress the plots which were weeded by hoe were accidently sprayed with hormone weed killer by the Estate Employee and for yield recording the experiment had to be abandoned. Nevertheless some interesting results were obtained. During the dry season (September–November) the cane plants in the unweeded plots could not compete with the weeds for water and all the plants in these plots dried out and died. The plots weeded by hoe at intervals showed normal growth but the leaves were badly curled in dry weather when there was a moderate weed infestation. The plots kept permanently free of weeds by hormone spray showed no signs of distress even during the driest period. This experiment showed very clearly the deleterious effect of weeds on cane growth in the dry districts of the island, failure to weed causing death of the cane plants. Clean weeding is thus a most essential operation in the dry parts of the Island: most of these weeds are annual weeds which are easily controlled by the hormone herbicides, M.C.P.A. and D.C.P.A. Although the density and rate of growth of weeds in the drier areas of the Island is considerably less than in the wetter parts, owing to the competition for water they do more harm to the growing cane than the much heavier weed infestation of the wet districts, since in the latter, competition is mainly for mineral substances and this can be corrected by appropriate fertilizer applications. The restricted use of hormone herbicides in the drier parts of the Island is due chiefly to inadequate spraying equipment, the cost of application with the small hand sprayers in use together with the cost of transport of water and the cost of herbicidal materials being too high in comparison with labour costs for weeding by hoe. Unfortunately results with the dusts available hitherto have been considerably less satisfactory than with liquid sprays, but new dust preparations have recently been received for experimental purposes.

No effective chemical control method is available for *Kyllingia polyphylla* (Herbe Madras, or Mota) and *Cyperus distans* both of which are relatively unaffected by the hormone weed killers. The V-blade cultivator is very effective for the removal of these weeds in free soils and is considerably more effective than disc harrows and rotary hoes which chop up the rhizomes—the latter growing again as soon as moisture conditions permit.

### Umbelliferæ

*Hydrocotyle bonariensis* (Herbe Bol or Tam Tam).—The most spectacular success of the hormone weed killers in Mauritius has been in the control of this weed. In young cane plantations two applications of 0·1 per cent. MCPA or DCPA has given effective control. Further work has confirmed the results previously presented in the 1946 Report with the exception that

even in the hot months complete control may be obtained with three sprayings of 0·1 per cent. or four sprayings of 0·05 per cent. During the course of the experiments carried out in 1947, it was noticed that heavy rain following applications of some preparations reduced the effect to a considerably greater degree than with other preparations. Three large scale experiments carried out on the same day using M.C.P.A. and D.C.P.A. (the latter as an oil emulsion) received two inches of rain within 1–3 hours of completing the application. The effect of the M.C.P.A. was very considerably reduced whereas the D.C.P.A. oil emulsion produced an excellent result.

A controlled experiment replicated three times was carried out at Plaines Wilhems Experiment Station using Methoxone (liquid agroxone), Barweed, and Ammonium 2–4 D at 0·1 per cent. concentration of active substance. The weather was fine for six days from the commencement of the experiment, but each replicate of three plots was treated as follows—

*(a)* No further treatment ;
*(b)* the equivalent of ½ inch of rain was applied with watering cans ½ hour after the spraying was completed ;
*(c)* ½ inch of rain 1½ hours after completion of spraying ;
*(d)* ½ inch of rain 4 hours after completion of spraying ; and
*(e)* ½ inch of rain 20 hours after spraying.

With no rain at all, the three substances fell in the order: ammonium 2–4 D, Methoxone, Barweed in the effectiveness of control of Herbe Bol. Rain falling within ½ hour reduced the effect of Barweed almost completely but ammonium 2–4 D still resulted in appreciable mortality of the weed, Methoxone occupied an intermediate position. Even when rain fell after 20 hours the effect of Barweed and to a lesser extent that of Methoxone was visibly reduced. Rain falling at intermediate periods had a progressively decreasing effect as the period without rain increased. It is considered that a period of 24–30 hours without rain was necessary for the full effects of these herbicides to be obtained.

The following shows the percentage leaves of the original stand of weed killed by the treatments (only the leaves of this weed appears above ground)—

| *Ammonium 2–4D* | *Methoxone* | *Barweed* | |
|---|---|---|---|
| 100 | 95 | 90 | No rain |
| 100 | 90 | 80 | Rain after 20 hours |
| 95 | 80 | 65 | Rain after 4 hours |
| 85 | 65 | 40 | Rain after 1½ hours |
| 75 | 40 | 10 | Rain after ½ hour |

Similar results to those detailed above have been obtained in trials with other weeds. From these results it appears that the sodium salt of 2–4 D is the least effective form of this substance and its activity is particularly decreased when rain follows soon after the application is made. The ammonium 2–4 D prepared from the pure acid according to the method described by Van Overbeek and Velez (1946) is very effective. It is not believed that the effectiveness of this preparation is due to a small quantity of free ammonia which may aid penetration as the Dupont Co's ammonium 2–4 D preparation is equally effective.

Herbe Bol has been used as a test plant to evaluate a large number of hormone weed killers which were on sale on the local market. These substances were tried at low concentrations 0·05 per cent.—0·1 per cent. of the active substance and the possibility of activating the substances with ammonium salts was tested. In general the sodium salts of 2–4 D were inferior to other forms even under dry conditions: Ammonium 2–4 D prepared from the free acid, Methoxone and Dow Co's. 2–4 D gave satisfactory results. It was confirmed that the weed is more easily controlled in a growing cane crop than in waste ground. In many instances, two applications of 0·05 per cent.—0·1 per cent. active substance gave satisfactory control. Dust forms were considerably less efficient. Some fifty demonstration sprayings were made at the request of Planters and large scale routine spraying of areas covered by this weed on estates has given results fully up to expectations. It is estimated that the weed has now been eradicated from an area of 2,500–3,000 arpents.

## Compositæ

*Ambrosia artemisiifolia* (Herbe Solferino).—Further work has been carried out on this weed species at different periods of the year, and the results obtained have surpassed those obtained in the preliminary experiments. Growth of the weed is very active during the period September–December, and it is considerably more susceptible to hormone herbicide at this period—a rank growth of the weed in the early flowering stage was completely killed by a single application of M.C.P.A. or D.C.P.A. at 0·2 per cent. Ammonium 2–4 D and forms in oil emulsion were considerably superior to other forms if rain fell soon after making the applications.

This weed reproduces freely from seed, samples of seed collected at the end of the fruiting season gave a high percentage germination even when planted immediately after picking. It is, therefore of considerable importance that control of this weed is effected prior to the setting of seed.

*Artemesia vulgaris* (Herbe Chinois).—Further experiments on this weed species has confirmed that complete eradication may be effected with 10 per cent. sodium chlorate. Concentrations of 2 per cent. and 5 per cent. chlorate failed to give complete control even when sodium pentachlorphenate at concentrations up to 1 per cent. were included with the chlorate. Since chlorate is in very short supply further work has been carried out with the hormone herbicides. These are definitely less effective against this weed than chlorate, but a good suppressing effect in growing cane was obtained by two applications of 0·2 per cent. M.C.P.A. and D.C.P.A. spaced about 1 month apart.

Collections of seed were made at intervals throughtout the fruiting season, but all the seed collected was infertile. There were no embryos in the shrunken fruits and no germination was obtained from a large collection of flower heads. It is apparent that this weed propagates solely by vegetative means under Mauritius conditions.

*Tridax procumbens* (Herbe Caille).—No experiments had been carried out on this weed in 1946: during 1947 several experiments were carried out mostly with methoxone at various concentrations, but a few included ammonium 2–4 D. This weed is susceptible to the hormone herbicides and and may be eradicated completely by treatment with these substances. At a spraying rate of 100 gallons per acre, the critical concentration for complete eradication lies between 0·15 per cent and 0·2 per cent. At a concentration of 0·1 per cent., 70–80 per cent. control is obtained.

**Boraginaceæ**

*Cordia macrostachya* (Herbe Condé).—A chemical herbicide for the complete eradication of Herbe Condé has been found. This is ammonium sulphamate. Herbe Condé is particularly susceptible to this herbicide and penetrates into the root stock and completely kills the plants. With low concentrations complete defoliation of the plant occurs but to prevent regrowth from the root stock a concentration of 2–3 lbs. per gallon is required. As the cost of ammonium sulphamate is somewhat high a considerable economy can be effected in clearing Condé land, if the Condé is first cut down and the new growth sprayed with the sulphamate solution. As ammonium sulphamate is not manufactured in the United Kingdom it is unlikely that supplies of this substance will be available for commercial use for some time.

On free soils Herbe Condé is easily eradicated in fallow land by the use of heavy cultivation implements such as disc ploughs. It is in rocky areas and in walls that chemical methods are particularly suitable for the destruction of this weed.

**Rubiaceæ**

*Pæderia fœtida* (Liane Lingue).—In spite of intensive experimentation no satisfactory method of controlling Liane Lingue has materialized. Although the leaves and young shoots are easily killed by Sodium chlorate, Ammonium sulphamate and several other herbicides, regrowth is comparatively rapid. Results with the hormone herbicides have also not been satisfactory, even at a concentration of 1·5 per cent. active M.C.P.A. and D.C.P.A. the response has been erratic and when growing in walls even this high concentration did not prevent regrowth.

At present the isopropyl ester of 2–4 D in water suspension and in kerosene solution and the triethanolamine ester of 2–4 D are under test against Liane Lingue but the results are not yet complete. No germination of seed of Liane Lingue has been obtained as yet, although the seeds are available. It is possible that they may require a certain period of dormancy before germination occurs.

**Leguminoseæ**

Further experiments carried out on Sappan *(Accacia concinna)* has fully confirmed the preliminary results obtained with sodium chlorate on this weed. Complete control is obtained with one spray application of 10 per cent. sodium chlorate providing the application is made in dry weather. Large bushes several feet high have been effectively eradicated by this method.

*Results of experiments with control of weeds previously not investigated.*—In addition to the experiments on the control of *Tridax procumbens* (Herbe Caille) work has been carried out on several weeds not hitherto investigated.

*Ipomea coccinea* (Liane patate).—This trailing weed is of particular importance in the Flacq district particularly in marshy areas. It was found that in this district two distinct species are known under the name of Liane patate—the true Liane patate closely resembles the trailing vines of the sweet potato, the shape of the leaves and the colour of the flowers being also similar. The second species is found in drier areas—the stems are more woody and the leaves more leathery and the flowers are yellow in colour. It is a member of the *Convolvulaceæ* (Ipomea sp.?) and has not previously been recorded in Mauritius: it has been sent to Kew for identification. The true Liane patate—*Ipomea coccinea*—proved to be very susceptible to the hormone herbicides. When growing in dryish areas it was killed by a single application of 0·1–0·15 per cent. M.C.P.A. and D.C.P.A., when actually growing in water—two applications of 0·1 per cent. may be required for complete eradication. The unidentified species was more resistant but was completely destroyed by one application of 0·25—0·30 per cent. Methoxone or Ammonium 2–4 D. At lower concentrations than 0·25 per cent. there was a small amount of regrowth.

*Eichornia speciosa* (Water hyacinth).—This weed which is a pest in the waterways of the U.S.A. is also a nuisance weed in the rivers and irrigation canals of the Flacq district. It was more severely affected by Ammonium 2–4 D than by Methoxone and Barweed at equal concentrations of the active substances. With concentrations of 0·1—0·3 per cent. active substance the aerial parts of the plant were completely destroyed but there was a varying amount of regrowth in all except the 0·3 per cent. Ammonium 2–4 D. Addition of Ammonium sulphate, ammonium phosphate, potassium phosphate, potassium sulphate and a complete N.P.K. mixture to the hormone herbicide did not appreciably affect the activity. Nutrient mineral substances in addition to Phenyl acetic acid, etc., were stated by King (1946) to prevent regrowth of water hyacinth when treated with D.C.P.A. Two applications of the hormone herbicides at 0·15—0·20 per cent. resulted in death of the plants.

*Tythonodora Linleyianum* (Via).—This member of the Aroideae grows in the marshy districts of Flacq. Spraying with 0·25 per cent. Methoxone and ammonium 2–4 D resulted in remarkable curvatures of the leaves and spindle of this plant, this was followed by slow death of the plants. Thorough coverage of the aerial parts of the plant is necessary to kill the plant in one application, and 0·25 per cent. active substance is the minimum effective concentration required for complete death of the plants.

*Nymphea stellata.*—Is a serious weed in the ponds of the Curepipe Municipal authorities. Although it shows considerable curvatures on treatment with M.C.P.A. and D.C.P.A. it has not been possible to eradicate the weed with these substances. After low concentrations had been shown to be ineffective the leaves were sprayed from a boat with 5 per cent. methoxone, (i.e., the product as sold diluted twice with water) and pure D.C.P.A. was

dusted on to the floating leaves. Although many individual leaves were killed by this treatment—new leaves were produced in abundance. Tins of copper chloride sunk into the lake only produced toxic effects over a relatively small area. No effective means of eradicating this weed in the lakes was found.

Some data has been obtained on other weeds in the swamp rice area of Flacq. *Jussieæ repens* is killed by M.C.P.A. at 0·15 per cent. in dry areas and by 0·25 per cent. in very wet areas or in stagnant water. *Herpestis monniera* is seriously affected but there were a few surviving plants even after treatment with 0·25 per cent. M.C.P.A.

Other weeds of the swamp rice areas which were eradicated by one or two applications of M.C.P.A. and D.C.P.A. at 0·15–0·20 per cent. are *Alocasia macrorhyza* (Songe) *Commelyna* spp. (Herbe Cochon), *Hydrocotyle asiatica* (Boileau) *Alternanthera sessilis* (Brede emballage). All these plants are killed with considerably greater difficulty when growing in stagnant water as compared to plants growing in drier areas.

*Effects of hormone herbicides on the growth of Sugarcane.*—Young sugarcane plants of the variety M.134/32 and various seedling varieties were sprayed with Methoxone (M.C.P.A.) and Ammonium 2–4 D. (Ammonium D.C.P.A.) at concentrations of 0·1, 0·2, 0·3, 0·5, and 1·0 per cent. of the active substances. The cane plants were properly given a full coverage of the spraying solution. Concentrations up to 0·3 per cent. produced no noticeable injury apart from a cessation or reduction in terminal growth of the shoots for 2–3 weeks after which growth was normal. This temporary reduction in the rate of growth had previously been noticed in field trials particularly when spraying was carried out in hot dry weather in fields of young cane plants. With concentrations of 0·3—0·5 per cent. reduced elongation was more marked and seemed to result later in conspicuous tillering, red pigmentation developed at the tip of the spindle and the margins of expanded leaves: in many cases this pigmented area dies. With concentrations of 0·5—1·0 per cent. some chlorotic lesions were produced on the young leaves, and the leaf sheaths clasped the stem more tightly. On examination it was noticed that in many cases the nodal tissues were considerably swollen and even though still enveloped by the leaf sheaths were deep purple in colour. The root primordia in the younger nodes were carried outwards as a thick ring of purple coloured tissue. The epidermis had been burst open by the increased volume of tissue below and could easily be peeled off. Damage had also resulted to the growth ring and the lower part of the internode. This commenced as a deep purple pigmentation followed by necrosis of the tissues.

These abnormal characteristics were produced by Ammonium 2–4 D at 1·0 per cent. but not in the plants treated with methoxone. It is apparent that D.C.P.A. does relatively more damage to sugarcane than does M.C.P.A. at equivalent concentrations. Of course, it should never be necessary drastically to treat sugarcane with such high concentrations of these substances. At the maximum concentrations normally employed (0·25 per cent.—0·30 per cent.) any deleterious effects are temporary and may include a temporary reduction

in the rate of elongation, some pigmentation of the leaves, occasionally some chlorotic lesions on the younger leaves and abnormal root primordia. Within three to four weeks the young plants fully recover from these temporary effects and with a concentration of 0·1—0·15 per cent. even these temporary effects are of rare occurrence.

*Effect on the growth of maize.*—Maize is considerably more susceptible to these substances than sugarcane. The chief effects are marked curvature of the stem of the plants and abnormal development of the root primordia. In many cases the individual root primordia developed as plates of fused tissue. Further development of still roots are adversely affected, even with concentrations of 0·1–0·15 per cent. active substance. However, if the maize is treated in its early stages of growth the effect of the hormone herbicides is negligible and the later treatments do not affect cob formation, but the plants may be more recumbent and less firmly anchored in the soil.

In many experiments in which young plants of *Argemone mexicana* (Chardon) were treated with sub-lethal doses of hormone-type herbicides, it was noticed that the plants abandoned the rosette type of growth and formed an elongated stem, on which abnormally shaped leaves were borne. This stem frequently reached a length of 6–10 inches and was in no way related to the usual formation of a flowering stem in plants of this species.

*Suggested procedure for the chemical weeding of cane plantations.*—Assuming that noxious grass weeds have been removed prior to plantation, the first weeding of the young cane plants may be carried out with Methoxone or 2–4 D product at 0·1–0·15 per cent. If labour is scarce at this time (as frequently is the case in crop time) the cane holes or furrows only may be sprayed. This enables the immediate vicinity of the young cane plants to be kept free of weeds. Should it be necessary to spray the interlines also, they should be sprayed as a separate operation using the Réduit compounded herbicide described earlier at X20 dilution either with or without the incorporation of hormone herbicides, but the young cane plants should not be sprayed with this solution.

When the young shoots are 18–24 inches in height, it is possible to incorporate dressings of sulphate of ammonia in the hormone herbicide spray. Sulphate of ammonia at 1 lb. per gallon (giving a dressing of 100 lbs. per arpent) may be added to 0·1–0·15 per cent. M.C.P.A. or D.C.P.A. and the mixture used for the cane holes or furrows. Sulphate of ammonia thus incorporated will extend the activity of the herbicide to control broad-leaved weeds which are resistant to the hormone herbicides, e.g., *Solanum nigrum* (Brede Martin) *Acalypha indica* (Herbe Chatte), etc., and will scorch young grass seedlings. The interlines should later be cleaned by hoe if there is growth of noxious weeds such as grasses and resistant sedges, (e.g., Mota-Kyllingia polyphylla), etc. Alternatively the interlines may be sprayed with the Réduit compounded herbicide at X20.

When the cane plants are about six months old both the rows and the interlines may be sprayed with the Réduit compounded herbicide at X 40 to X 50. If weeds susceptible to hormone herbicides such as Herbe Bol, Herbe Chinois, etc., are present, Methoxone or 2–4 D is incorporated in the spray at 0·15–0·20 per cent. For all further weedings which may be necessary this

mixture would be used. If patches of resistant weeds such as Mackaye (Phalaris arundinacea) Chiendent (Cynodon dactylon) etc., are still present these may be spot sprayed with the Réduit compounded mixture at X15 to X 20 dilution providing that care is taken to avoid direct spraying of sugar-cane leaves. No harmful effects on the cane plants through applications to the soil near the base of the plants will result from this treatment.

*Suggested procedure for the weeding of Aloe Fibre plantations.*—Many aloe fibre plantations are made in the rocky soils of the drier regions where the most important weeds are shrubby weeds particularly Herbe Condé (Cordia macrostachya) and Vielle Fille (Lantana camara). It is difficult to eliminate these by cultural means prior to making the plantation. These shrubs should be cut as close to the ground as possible prior to making the plantation and when new shoots are 8–12 inches high, the Condé plants should be sprayed with ammonium sulphamate at 2–3 lbs. per gallon and the Vieille Fille with Methoxone or 2–4 D at 0·2 per cent. These treatments will kill these plants, but new seedlings may later arise from seed.

Alternatively the aloe plants may be planted after the shrubby weeds have been cut down, the latter being suppressed by spraying at intervals with the Réduit compounded herbicide at X 40 to X 60. This concentration is sufficient to defoliate the young shoots of these plants at a low cost of approximately Rs. 5–6 per arpent. This treatment is repeated when necessary and will keep these shrubby weeds permanently suppressed and they will finally die.

*Recovery and maintenance of Condé infested pastures.*—In rocky areas invaded with Condé, the only means of destroying the Condé chemically is by the above procedure of cutting down the plants close to the ground and spraying new growth with Ammonium sulphamate. For maintenance of pastures which are in the process of being colonized by the shrub the cheapest method is by frequent spot spraying of existing plants with the Réduit compounded herbicide at X 40–X 50 dilution.

*Spraying equipment.*—The spraying equipment generally in use at present is inadequate for any considerable extension of the spraying programme. On flat terrain power sprayers can be effectively used either directly propelled or attached to a tractor: smaller type may be mounted on bullock carts. On rocky uneven land it is probable that the system of using one pump at the side of the field to pump the liquid and obtain the required pressure for a unit of 10 or 12 portable sprayers is the most effective system. No such units are at present in use in Mauritius.

*Investigations on the fertilizer value of crushed basaltic rock.*—For many years the Manager of Highlands S.E., Mr. L. N. Austin, and the Chemist of Highlands S.E., Mr. O. d'Hotman de Villiers, have been engaged on experimental work on the value of basalt rock dust for the poor, highly leached soils of the upper parts of the estate. The experiments had been laid down on proper statistical lines and had been repeated for several years. Data on yields of cane and on sucrose per cent. cane were available. Analysis of the data showed conclusively that the application of rock dust at rates up to 90 tons per acre caused a significant increase in both cane yields and in the sucrose content of the juice.

It was considered, therefore, that this subject required thorough investigation—

*(a)* with a view to determining whether the preparation and application of rock dust is economically feasible ; and

*(b)* to attempt to determine what constituent or constituents of the dust is responsible for the increase in cane yield and quality and whether or not the physical effect of the dust on the soil is also important.

The question has been approached from the point of view of field experimentation and by means of pot experiments.

A $3 \times 2 \times 2$ factorial experiment has been laid out at Hermitage (Highlands S.E.) consisting of three levels of basalt dust, viz., none, 91 tons and 182 tons per acre in all combinations with normal estate fertilization, and twice the normal estate fertilization and with the varieties M.134/32 and M.63/39. There are three complete replications with certain higher order interactions confounded to give six effective replications.

Complete leaf analysis of the cane plants in the various treatments and data on cane yields, sugar content and minerals at harvest time are to be made in order to determine the effect of the dust at varous fertilizer levels on the yield and chemical constitution of the crop.

In the meantime a series of pot culture experiments are in progress and the results of the first series are now complete.

Hermitage soil was used in pots of 2 gallons capacity. The following treatments were applied—

A. Hermitage soil only with addition of nitrogen fertilizer.

B. Hermitage soil plus the equivalent of 100 tons per acre of rock dust intimately mixed with the soil, with addition of nitrogen fertilizer ;

C. As B, but the equivalent of 200 tons per acre of rock dust mixed with the soil ;

D. As C, but the 200 tons dust placed in one layer at a depth of 2–5 inches below the surface ;

E. Hermitage soil plus complete fertilizer application.

Nitrogen fertilizer was the same for all treatments and consisted of 10 grams of a mixture in equal parts by weight of ammonium sulphate and ammonium nitrate. Treatment E received in addition 5 grams calcium phosphate, 5 grams potassium sulphate, 3 grams magnesium sulphate, and $\frac{1}{2}$ gram each of copper sulphate, zinc sulphate, iron sulphate, manganese sulphate and boric acid. There were four replications of each treatment arranged in a randomized block design.

A further treatment F was included, but of this there were only two replicates. Treatment F was identical to treatment E with the exception that magnesium sulphate was omitted.

The pots were sown with 50 oat seeds and the plants were subsequently thinned to 36 per pot. All fertilizers were dissolved in distilled water and applied evenly over the surface. The pots were regularly watered with collected rain water, each pot being given the same quantity of water.

Germination was good in all the pots but after two weeks marked differential effects became apparent. The ' A ' treatment showed compound deficiency symptoms at an early stage. The plants were dark bluish green in colour indicating phosphate deficiency from the commencement but later also showed tip and marginal scorch indicative of potash deficiency. Still later discontinuous whitish chlorotic areas appeared in the interveinal region of the older leaves quite distinct from the marginal scorch. These chlorotic areas progressed towards the base of the leaves until many leaves dried out and died: in some plants it affected the younger leaves also. The tissues in the younger leaves were shrunken and superficially resembled the shrinkage following attack by thrips. With the development of the root system the plants slowly recovered but some tip and marginal scorch was visible in this series throughout the course of the experiment.

The plants in the basalt treated pots B, C and D were also dark bluish green in colour and showed a certain amount of tip and marginal scorch, but not the white chlorotic areas. They recovered from the tip and scorch symptoms more rapidly, however, although they continued to show the bluish green colour indicative of phosphate deficiency.

The ' E ' treatment providing quantities of all essential elements estimated to supply the normal requirements of the plants were a healthy green colour from the start of the experiment, showed no abnormal symptoms and growth was very rapid compared to the other treatments. Towards the end of the experiment it was obvious that the space provided in the pots was inadequate for the plants in the ' E ' treatment enabling the other treatments to catch up to some extent so that final differences were not as great as had been the case earlier in the experiment.

The ' F ' treatment given all essential minerals with the exception of magnesium showed good growth and for some time was not appreciably slower in growth than the ' E ' treatment.

Subsequently, however, the leaves and stems appeared narrower in the ' F ' treatment and a few weeks later the leaves showed a mottled appearance characteristic of the figured symptoms of magnesium deficiency. The green colour was restricted to the main central vein of the leaf and to localized areas on each side.

Confirmation that these symptoms, were in fact due to magnesium deficiency was obtained by injection of several leaves by the leaf tip method, the tips of the leaves being cut and immersed in small vials containing 0·25 per cent. magnesium sulphate. After ten days the chlorotic mottling had disappeared from the treated leaves for one half to two thirds of their length from the tip.

The magnesium deficiency symptoms were very marked for a period of some weeks of frequent rain, later when the conditions were dry the symptoms gradually disappeared.

It would appear that the presumably low supply of magnesium readily available was leached out during the period of frequent rain but accumulated to a sufficient extent to cause the symptoms to disappear under drier conditions. Alternatively it is possible that the rain water used may have contained traces of magnesium salts. In any case it is apparent that this Hermitage soil when given adequate quantities of the major fertilizers produces magnesium deficiency symptoms in oat plants, indicating that the reserves of available magnesium in this soil are very low.

Midway through the experiment, it was apparent that there were no observable differences between treatments C and D, i.e., 200 tons basalt mixed with the soil and the same quantity placed in a continuous layer. It was, therefore, decided to abandon treatment ' D ' in so far as the original treatment was concerned and differential treatments were accordingly superimposed on the four ' D ' pots. Pot D 1 was given 5 grams of potassium sulphate, pot D 2, 5 grams of calcium phosphate, pot D 3, 5 grams of potassium phosphate and pot D 4, 5 grams of potassium phosphate plus 5 grams of magnesium sulphate. The results of this differential fertilization of the four ' D ' pots were quite apparent within 2–3 weeks.

Apart from a slight improvement in the colour of the leaves there was no marked effect of the addition of potash to the pot D 1, the growth was not appreciably improved and the leaves still stood in an abnormally upright position.

The effect of the phosphate application to the pot D 2 was extremely marked—growth was accelerated, the leaves lost their bluish green colour, increased remarkably in size and adopted the normal drooping posture of the tips. Tillering of the plants, which had been almost negligible, proceeded actively. The effect of applying potassium phosphate to pot D 3 was similar in all respects to that of applying calcium phosphate to pot D 2 with the exceptions of the fact that the fertilizer produced a temporary scorching effect on the tips of some of the leaves. The mixture of potassium phosphate and magnesium sulphate applied to pot D 4 did not cause any scorching effect possibly because of the formation of the less soluble magnesium phosphate when the two fertilizers were dissolved in water for application. The response was very marked in this pot also—it appeared to be a greater response than that obtained in D 3. The improvement in the size of leaves, diameter of stem and degree of tillering was somewhat better than in any other ' D ' treatment. All the plants were harvested after 10 weeks growth. The fresh weight of the aerial portions are given below in grams per pot.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $A_1$ | 45 | $B_1$ | 50 | $C_1$ | 60 | $D_1$ | 68 | $E_1$ | 252 |
| $A_2$ | 39 | $B_2$ | 57 | $C_2$ | 60 | $D_2$ | 91 | $E_2$ | 235 |
| $A_3$ | 40 | $B_3$ | 59 | $C_3$ | 76 | $D_3$ | 90 | $E_3$ | 246 |
| $A_4$ | 48 | $B_4$ | 64 | $C_4$ | 73 | $D_4$ | 121 | $E_4$ | 258 |

MEANS A=43 B=57·5 C=67·25 E=247·75

Significant difference (P=0·05)=10 grams.

The quantitative data support in large measure the qualitative observations made during the growth of the plants. The yields of the different pots in each series were satisfactorily uniform the slightly greater values in pots 3 and 4 being largely due to positional variation.

It is apparent from this experiment that the addition of the equivalent of 100 tons per acre of rock dust resulted in an increase in yield of 33·7 per cent. when Nitrogen was the only additional fertilizer given. Increasing the quantity of dust applied to 200 tons per acre resulted in a total increase of 56·4 per cent. over the controls. These increases are highly significant.

As would be expected the yields of the ' E ' pots given adequate and complete fertilization are the highest. The differentially treated ' D ' series gave useful indications of the contribution of the dust towards the requirements of major elements by the oat plants. Although it is apparent that the differential effects superimposed on the ' D ' series were made only half way through the experiment and therefore could not be expected to produce the full effects in the time available up to the end of the experiment, nevertheless large responses have been produced by some of the treatments applied. The fact that $D_1$ produced a yield almost equal to the mean of the four ' C ' pots shows that the response to potash only was very small if any, indicating that the plants were obtaining some potash from the basalt. Phosphate only ($D_2$) caused a considerable response whereas potash and phosphate ($D_3$) only produced an equal effect to phosphate alone once more supporting the evidence that the effect of additional potash was small. It is rather difficult to interpret the further increase in response when magnesium, potash and phosphate was applied, unless the interaction between magnesium and the other fertilizers is concerned, in view of the fact that the dust contains a considerable proportion of magnesium.

The analysis of the oat plants grown in this experiment is given below in terms of dry matter and as total grams contained in the oat plants growing in each pot.

% Dry Matter

| *Treatments* | *N* | $P_2O_5$ | $K_2O$ | $C_aO$ | $M_gO$ |
|---|---|---|---|---|---|
| A ... | 3·24 | 0·37 | 0·81 | 1·01 | 0·71 |
| B ... | 2·88 | 0·29 | 1·44 | 0·70 | 0·53 |
| C ... | 3·00 | 0·31 | 2·41 | 0·64 | 0·51 |
| $D_1$ ... | 3·24 | 0·31 | 5·17 | 0·57 | 0·34 |
| $D_2$ ... | 3·64 | 0·56 | 2·46 | 0·98 | 0·61 |
| $D_3$ ... | 3·68 | 0·71 | 4·51 | 0·77 | 0·50 |
| $D_4$ ... | 3·68 | 0·65 | 4·40 | 0·69 | 0·54 |
| E ... | 3·28 | 0·51 | 4·31 | 0·59 | 0.20 |

Total grams absorbed per pot

| | | | | | |
|---|---|---|---|---|---|
| A ... | 0·279 | 0·032 | 0·070 | 0·089 | 0·061 |
| B ... | 0·336 | 0·034 | 0·284 | 0·082 | 0·062 |
| C ... | 0·423 | 0·044 | 0·340 | 0·090 | 0·072 |
| $D_1$ ... | 0·440 | 0·042 | 0·703 | 0·078 | 0·046 |
| $D_2$ ... | 0·719 | 0·111 | 0·486 | 0·194 | 0·120 |
| $D_3$ ... | 0.745 | 0·144 | 0·913 | 0·156 | 0·101 |
| $D_4$ ... | 0·891 | 0·157 | 1·064 | 0·167 | 0·131 |
| E ... | 1·789 | 0·278 | 2·351 | 0·322 | 0·109 |

With respect to the concentration of minerals in the plant, (i.e., content per cent. dry matter) the most interesting point is that the rock dust has not appreciably altered the nitrogen and phosphate content but has caused a substantial increase in the potash content. The first 100 tons per acre has raised the potash content from 0·81 per cent. to 1·44 per cent. and the second 100 tons has raised it still further to 2·41 per cent. This latter figure is confirmed by the value of the potash content for the $D_2$ pot—2·46 per cent.—which is comparable in that it received 200 tons of dust and no other potash application. The potash content of the plants receiving as much as 200 tons per acre rock dust is still considerably below that of the plants receiving potash fertilizer ($D_1$, $D_3$, $D_4$ and E). The increase in the potash content of the plants with increasing dosage of rock dust is accompanied by a decrease in the content of calcium and magnesium and this antagonism is further shown by a comparison of $D_1$ and $D_2$ (200 tons basalt dust with and without potash respectively). Of considerable interest also is the relatively low content of magnesium in the ' E ' series in spite of the fact that these pots had received 3 grams of magnesium sulphate. No analytical results were available for the two ' F ' pots without magnesium as these had been sacrificed for injection experiments.

It is apparent that when the total quantity of mineral substances taken up per pot is considered the rock dust has slightly increased the total uptake of nitrogen and phosphate. This has probably resulted from the greater root growth and branching of the roots in the pots treated with rock dust. This effect was very noticeable and was particularly the case in the ' D ' pots where root growth in the rock dust layer was profuse, and branching and root hair formation were particularly dense. The greatest effect of the dust, however, has been on the uptake of potassium, 100 tons of dust per acre having caused a four-fold increase in the potash taken up and 200 tons per acre a five-fold increase as compared to the plants grown in the soil alone. In the absence of phosphate the dust has not caused an appreciable increase in the up-take of calcium and magnesium in spite of its high content of these substances, but if the phosphate deficiency is first corrected then the dust increases uptake of calcium and magnesium very appreciably.

The results of this experiment may be summarized as follows—

1. The Hermitage soil is highly deficient in Nitrogen, Potash and Phosphate, and possibly in Magnesium and other elements.
2. Rock dust supplies an appreciable quantity of available potash but supplies little or no available phosphate.
3. When the requirements of the soil for Nitrogen, potash and phosphate is satisfied, a deficiency of magnesium becomes apparent.
4. When phosphate requirements are satisfied the oat plants take up appreciable quantities of Calcium and magnesium from the rock dust.

This experiment is naturally only a beginning in so far as unravelling the full effects of the dust on plant growth on these poor soils is concerned. Nevertheless it is now known that potash, calcium and magnesium are supplied by the dust but not phosphate. Further experiments are in progress to determine what other elements are supplied by the dust.

Some preliminary field experiments have also been laid out to test the effect of applications of additional mineral nutrients such as magnesium, zinc, manganese, etc., on these poor soils. It is apparent that the elucidation of the problems of mineral nutrition of the cane on these poor highly leached soils of the wet districts may have considerable practical value. There seems to be very little doubt that magnesium may, at times, be deficient in these soils, particularly under heavy rainfall conditions and some responses to leaf tip injection of magnesium salts have been obtained on cane grown in these regions. It is possible also that one or more trace elements may be deficient but not sufficiently so to produce clearly defined symptoms.

*Investigations on the use of organo-mercurial compounds for the treatment of cane cuttings.*—As stated in the 1946 Annual Report, this work is a co-operative project between this Division and the Plant Pathology Division of the Department of Agriculture, the present writer being responsible for the Physiological aspects of the investigation. During the year it was felt that sufficient information had already been obtained to guide the Planting community in the use of these substances and the results were so clear-cut that it was necessary that their use should become part of the cultural routine of sugarcane cultivation immediately. Accordingly the results were published in Bulletin No. 19 of this Station. The following are the main points which emerged from this work.

1. Incidence of Pineapple disease *(Ceratostomella paradoxa)* is highly correlated with the density of the pathogen in the soil. Artificial inoculation of soil with a spore suspension of the pathogen significantly increased the incidence of the disease for at least 3 months following the inoculation.

2. Dry conditions favour the development of the disease: irrigation reduces incidence of the disease considerably.

3. A number of organo-mercurial compounds including Aretan, Agrosan G, Ceresan, Harvesan, Abavit and Verdasan significantly reduced the incidence of the disease. To a lesser degree preliminary soaking in lime water was also effective. In general, Aretan was the most effective of these substances.

4. There was a higher degree of protection against the disease in artificially inoculated than in noninoculated plots, and there were indications that the higher the density of the organism in the soil somewhat higher concentration of the organic mercury compounds is required.

5. In contrast with the relatively small differences in the efficacy of the substances tested for the control of the disease, there are large differences in their effects on early growth of the shoots. Aretan and frequently lime water also have the property of stimulating growth of the shoots. Aretan in particular causes a considerable increase in the number of shoots, in their total and mean length and in the length of shoots per germinated cutting, and this effect is apparent even in the secondary tillers produced on the primary shoots.

6. The application of molasses one or two weeks before planting significantly reduces the incidence of Pineapple disease in the absence of organo-mercurial treatment. The molasses effect may possibly be brought about by an increase in the number of organisms antagonistic to the Pineapple disease organism. Treatment with organo-mercurials completely masks this effect.

7. Marked differences in the reaction of different varieties to the disease have been established. The variety M.63/39 was resistant, i.e., it contracted the disease less readily and moreover death of the cuttings following the attack is rare. M.112/34 was susceptible—it contracted the disease readily and there was almost 100 per cent. mortality amongst the infected cuttings. Other varieties were slow in contracting the disease, but once infected showed no tolerance and the cuttings succumbed to the disease, while still others contracted the disease readily but showed considerable tolerance, mortality of the cuttings being the exception rather than the rule. These differences in disease reaction caused significant differences in the growth responses of the varieties.

8. The beneficial effects of Aretan and Lime water soaking are not additive, in fact there is strong evidence, that in many varieties, lime water soaking reduces considerably the beneficial effect of Aretan.

9. Yield results at harvest indicated that Aretan treatment caused a significant increase in final yield—frequently amounting to 4 tons of cane per acre in the plant crop. This yield effect was considerably smaller with other organo-mercurial compounds tested.

The yield results of the field trials harvested in 1947 are given in the following table—

YIELDS IN TONS PER ARPENT

| *Locality and Variety* | *Ceresan* | *Aretan* | *Agrosan* | *Lime* | *Controls* |
|---|---|---|---|---|---|
| Labourdonnais (M 112/34) ... | 21·7 | 24·3 | 20·1 | 21·5 | 20·2 |
| Sottise (M 134/32) ... ... | 25·6 | 27·6 | 25·8 | 25·4 | 24·4 |
| Gros Bois (M 134/32) ... ... | 29·8 | 35·0 | 27·3 | 29·5 | 29·8 |
| Savinia (M 134/32) ... ... | 31·9 | 35·1 | 30·8 | 33·9 | 31·7 |
| Henrietta I (M 134/32) ... | 31·3 | 31·9 | 31·7 | — | 28·8 |
| Henrietta II (M 134/32) ... | 28·7 | 29·5 | 30·3 | — | 25·9 |
| Sans Souci (Mean of 5 varieties) | 36·1 | 36·6 | 38·1 | — | 33.6 |
| Means of 7 trials ... ... | 29·3 | 31·5 | 29·2 | — | 27·8 |

Significant difference = 1·5 tons

*Test of new substances.*—A sample of a liquid organo-mercurial described as sugarcane disinfectant (mercurial) and hereafter referred to as S.D.M. was submitted for tests by Mr. Emmanuel Cadet on behalf of Messrs. Pennington Stevens and Taylor Ltd., London. Two experiments have been laid down to test this material and the results of the first experiment are now available.

There were 24 blocks in the experiment, 12 in the variety M.112/34 and 12 in the variety M.76/39, four blocks of each variety tested the substances at low concentrations, four blocks at medium concentrations and four blocks at high concentrations: and there were six plots in each block. The basic comparisons were as follows—

| *Low Concentration* | *Medium Concentration* | *High Concentration* |
|---|---|---|
| Controls (untreated) | Controls (untreated) | Controls (untreated) |
| Soaked in lime water for 24 hours | Soaked in lime water for 24 hours | Lime water for 24 hours |
| S.D.M. at 50 ccs. to the gallon | S.D.M. at 100 ccs to the gallon | S.D.M. at 150 ccs. to the gallon |
| Soaked in lime water then treated with S.D.M. at 50 ccs. to the gallon | Lime water plus S.D.M. at 100 ccs to the gallon | Lime water plus S.D.M. at 150 ccs per gallon. |
| Aretan at 0·5 % | Aretan at 1·0% | Aretan at 1·5% |
| Soaked in lime water then treated with Aretan at 0·5% | Lime water plus Aretan at 1·0 % | Lime water plus Aretan 1·5 % |

Data on incidence of Pineapple disease taken by Mr. Rochecouste of the Pathology Division are summarized below—

NUMBER OF CUTTINGS INFECTED WITH PINEAPPLE DISEASE

| | *M112/34* | *M76/39* | *Total (both varieties)* | |
|---|---|---|---|---|
| Controls ... ... ... | 41 | 38 | 79 | (out of 240 cuttiugs) |
| Lime water ... ... ... | 37 | 13 | 50 | do. |
| S.D.M. ... ... ... | 20 | 20 | 40 | do. |
| S.D.M. + Lime water ... | 26 | 14 | 40 | do. |
| Aretan ... ... ... | 15 | 13 | 28 | do. |
| Aretan+Lime water ... | 30 | 9 | 39 | do. |

The results of the Pineapple disease counts may be summarized as follows—

Aretan alone afforded the most effective protection against the disease, but preliminary soaking with Lime water reduced the effect of Aretan particularly in the susceptible variety M.112/34. S.D.M. reduced the incidence of the disease by 50 per cent. but was not so effective as Aretan alone. Prior soaking with Lime water did not appear to reduce the effectiveness of S.D.M.

NUMBER OF BUDS GERMINATED

| | *M 112/34* | *M 76/39* | *Total, both varieties* |
|---|---|---|---|
| Controls ... ... ... | 33 | 104 | 137 |
| Lime water ... ... | 31 | 153 | 188 |
| S.D.M. ... ... ... | 90 | 151 | 241 |
| S.D.M. and Lime water... | 64 | 181 | 245 |
| Aretan ... ... ... | 109 | 159 | 268 |
| Aretan and Lime water ... | 56 | 155 | 211 |

TOTAL LENGTH OF SHOOTS

| | *M 112/34* | *M 76/39* | *Total, both varieties* |
|---|---|---|---|
| Controls ... ... ... | 165 | 649 | 814 |
| Limewater ... ... | 202 | 1,044 | 1,246 |
| S.D.M. ... ... ... | 439 | 958 | 1,397 |
| S.D.M. + Limewater ... | 387 | 1,071 | 1,458 |
| Aretan ... ... ... | 692 | 1,016 | 1,708 |
| Aretan + Limewater ... | 342 | 1,104 | 1,446 |

In the susceptible variety M.112/34 aretan is significantly superior to all other treatments with respect to number of buds germinated and total length of shoots. This experiment has confirmed previous results that there is no advantage in soaking in Lime water prior to Aretan treatment—indeed this reduces the effect of Aretan considerably. In the tolerant variety there are no significant differences between the various treatments apart from the fact that they are all significantly better than the untreated controls.

A second trial is now in progress to test the effect of S.D.M. at 50, 100 and 150 ccs. per gallon against Aretan at 0·5, 1·0 and 1·5 per cent. on three varieties M.112/34, M.76/39 and M.134/32.

*Results of an investigation on method of propagation of Eupatorium pallescens.*—This plant introduced from Java some years ago is propagated as a food plant for Scoliid parasites. Some planters were experiencing difficulty in the propagation of these plants from cuttings and the writer's advice was sought.

Experiments carried out at Réduit indicated that the problem was not so much in difficult rooting of the cuttings as in excessive loss of moisture which caused the cuttings to dry out before root formation was initiated, some rotting of the basal end of the cuttings also frequently occured. As Estates would not be justified in erecting solar propagators to prevent excessive loss of moisture some more practical means had to be devised.

It was found that the most practical method was to dip the cuttings completely in molten paraffin wax of low melting point. Using cuttings of 8 inches in length, each half is dipped in melted wax in a boiling tube or large test tube. It is an advantage to previously dip the lower end of the cutting in a 1 per cent. Aretan solution, which prevents the lower end from rotting. No further advantage was obtained by dipping the end of the cutting in various growth hormones. Using the Aretan and melted wax technique 80-90 per cent. of the cuttings became established even under dry conditions when only 10 per cent. of the untreated cuttings struck. It is recommended that this method be used as a routine method whenever large numbers of established plants of this species are required for planting along the margins of the fields.

*Preliminary experiments on the preservation of the Sugarcane pollen for breeding work.*—Officers of the United States Department of Agriculture successfully crossed a Sugarcane variety flowering in the Southern Hemisphere with pollen from a variety which only flowered at the same time of the year in the Northern Hemisphere. The pollen was stored and transported by plane. Seedlings were obtained from the cross thus effected, four days having elapsed between the collection of the pollen and its use for pollination. As a result of a request for pollen for crossing work at the South African Sugar Experiment Station Natal, some preliminary experiments were carried out. Pollen was stored at various relative humidities at a temperature of 0°C in air and in an atmosphere of Carbon dioxide, with and without admixture with talc. Germination tests were carried out on Sucrose-agar at intervals. The main conclusions drawn from these experiments were as follows—

1. There was no advantage in using an atmosphere of carbon dioxide: storage in air was equally effective.

2. The pollen keeps better with increasing humidity but if kept in a saturated atmosphere clumping of the grains becomes marked after 4 days. Admixture of pollen with talc prevented this clumping but the germination of the pollen was greatly reduced.

3. Storage at 85 per cent. humidity at 0°C was effective in preserving the pollen without excessive clumping of the grain.

4. The rate of growth of the pollen tube decreases steadily with increasing time of storage.

5. Addition of 0·01 per cent. malic acid to the sucrose-agar medium increases its effectiveness as a germinating medium for pollen grains.

6. Although germination in artificial culture was obtained in pollen kept for 12 days, such pollen did not produce fertile seeds when used for crossing male sterile varieties.

7. At present fertile seeds can only be obtained with pollen kept under such conditions for maximum of 3–4 days.

One experimental consignment of pollen was sent to South Africa in the cool store of a ship with mean temperature of 5°C. Seven days elapsed between the collection of the pollen and its use for pollination. Only one seedling was obtained from the cross. It was realised that the temperature was somewhat high but it was considered worth while to take advantage of the opportunity.

## Publications

The writer published a series of papers on weed control during the year in the Mauritius Agricultural Review, and with the Plant Pathologist of the Department of Agriculture was joint author of Bulletin No. 19 of the Sugarcane Research Station.

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H. EVANS—*Botanist,*
*Acting Officer-in-charge.*

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